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COUNTER-INSURGENCY GAME DESIGN FEASIBILITY AND EVALUATION STUDY

November 1965

A Study for

THE ADVANCED RESEARCH PROJECTS AGENCY
The Pentagon
Washington, D.C.

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Prepared by

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COUNTER-INSURGENCY GAME DESIGN FEASIBILITY AND EVALUATION STUDY

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1. SYNOPSIS

This report presents the results of a six-month effort by Abt Associates Inc. to develop a game and explore the feasibility of a computer model based on game findings that simulate some of the major aspects of the terror-phase of internal revolutionary conflict. The game, known as the ARPA-AGILE COIN GAME, was played fifteen times by a varying group of Abt Associates Inc. staff members, area experts, scholars from Harvard and M.I.T., and players from several government agencies.

In the course of the manual simulations the game's rules and conditions were refined toward increasing realism and playability.

A set of detailed flow charts was developed for a design for a computer model simulation of elements of the terror phase of internal war, based on the game. The game was refined to the point of readiness for its application to counterinsurgency (COIN) training.

This report covers the usefulness of manual games and simulation for insurgency research; the COIN Game design, development and testing; research findings; the man-machine method for model building; and the AGILE-COIN model simulation.

2. CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

1. The manual game and simulation design demonstrate the feasibility of modeling at least some of the major political and military aspects of insurgency.

2. The method of developing a man-machine simulation by means of first designing, operating, and refining a manual game, appears feasible.

3. Operation of the manual game greatly clarified the subtle and complex interaction dynamics of responsive decision-making which are usually most difficult to model directly, thus reducing overall simulation design time.

4. Display and logic requirements for a complex simulation appear to be determined most effectively by the operation of a manual game with substantive experts as players.

5. The manual game, simulating the terror phase of insurgency, appears to be a useful training aid for non-expert personnel.

RECOMMENDATIONS

1. The AGILE-COIN GAME simulation design should be programmed, exercised, tested, and validated for use as a "laboratory" in which alternative policies can be experimented with, and the consequences of various assumptions can be forecast.

2. A modification of the game and simulation dealing specifically with urban insurgency should be designed and programmed.

3. A modification of the game and simulation emphasizing the pre-violent, subversion aspects should be designed and programmed.

4. A version of the game and simulation that deals with a specific geographic region at a specific time should be developed using empirical data.

5. A direct contact should be established and maintained between simulation designers and operators, and field researchers. In this way pressing field problems can be researched on a quick-reaction basis, and the simulation can be improved more rapidly by its exercise of empirical data.

3. PROBLEM APPROACH

3.1 Utility of Simulation for COIN

The utility of simulation for counterinsurgency is the result of the complexity of the problem and the state of our knowledge about it. If the problems of counterinsurgency could be described in terms of a small number of variables, like most physical processes, mathematical analysis could soon solve them. If the state of social science knowledge were comparable to that of the physical sciences, in which most important variables and relationships can be defined quantitatively, direct mathematical analysis would possibly be more attractive a method than simulation.

The situation now is that we must deal as best we can with a complex problem that has not been described in quantitative form. Simulation is one way of moving from the qualitative to the quantitative, and from subjective impressions to objective analysis, theory building, experiment, theory correction, prediction, and control. And that is the final objective of our applied research--control of insurgencies.

What can simulation do that conventional social science research cannot? Simulation can integrate many diverse elements of knowledge about a complex process, where those elements must be so integrated to operate realistically because they are mutually dependent. Simulation is nothing but the dynamic exercise of a theory about a process in time, under varying starting conditions, constraints, and parameter values. As such, simulations are experiments with analogical models of complex systems such as social groups or military forces that cannot practically be manipulated for experimental purposes in real life.

The utility of simulation is therefore the utility of experimentation--basic to the conception, expression, correction, and refinement of theory. And a theory about a process is essential to its description, prediction, and control.

Simulation may take the form of manual games, man-machine games, or all-computer simulations, but they are all basically experiments with

complex systems comprising various values, combinations, and relationships of numerous variables. There may be something inelegant and 'brute-force' about 'cut and try' experimentation by simulation techniques or any other--but it appears to be the only technique we have for learning about insurgency other than a series of costly wars.

3.2 Uses of Manual Gaming

A model is a simplified representation of objects, states of objects, and events. It is basically a theory about a situation representing the phenomenon involved in it. Its utility results from its manipulability in experiments, where experimentation with the real world subject of the model is impractical. Models can be used to describe, explain, predict, and control. In the case of modeling or simulating insurgency, we must resort to this form of experimentation because real world trials are too long and costly, and because the large number of qualitative variables preclude direct mathematical analysis.

Games such as the ARPA-AGILE COIN GAME are useful in helping to develop decision models, by providing tests of the relevance of variables and their structural relationships for specific problem contexts such as terror-phase insurgency. The relative significance of the qualitatively identified variables in internal revolutionary conflict is not clearly understood. Manual gaming clarifies their relative importance in the course of successive plays, providing information useful for quantitative weighting factors in a computer model simulation.

Games help develop model theory, suggest hypotheses for test, and test hypotheses. However, strong inferences cannot be drawn from game plays concerning decisions made in the reality simulated by the game, because the behavioral variables cannot be sufficiently controlled or measured. This is another reason why gaming is no substitute for model simulation, although it is a useful step toward model simulation.

Manual games offer at least three other important benefits. These are training, identification of data requirements, and direct stimulation of insights about the problem gamed.

The current degree of specialization in the social sciences and engineering arts (such as computer programming) limits the communication between substantive expert and model methodologist. Both experts and trainees can rapidly understand the rules and events of a COIN game,

and are thus able to interact with it critically and creatively. A game can be considered to be a device for integrating and communicating information.

Since the most critical early phase of internal revolutionary war involves political, social, psychological and cultural processes, it seems effective to experiment in an arena giving full play to human interactions. A "manual" game provides rapid, direct human interaction giving play to the social science variables of interest.

There is some uncertainty about the comprehensiveness of even our qualitative understanding of the Internal Revolutionary Conflict (IRC) process. The COIN game has indicated gaps in the substantive coverage of variables, operations, and data. A computer model would eventually also have indicated such gaps, but only after much expensive programming, de-bugging, simulation, printout analysis, re-design, re-programming, further de-bugging, and further simulations and analysis.

A manual game car be designed, operated, and modified relatively quickly--in a matter of a month or two--compared to the better part of a year at least for a checked-out computer model. Since COIN problems are already pressing, no quickly responding technique should be neglected.

4. GAME DESIGN

4.1 Aspects of COIN Chosen for Simulation by Manual Gaming

The aspects of COIN chosen for simulation by manual gaming were those that appeared to offer the best match between extant research needs and methodological capabilities. The military aspects of guerrilla warfare are well understood, compared to the politico-military problems of the prior terror phase.

Scholars and analysts are in broad agreement that insurgency is best 'nipped in the bud' --in the early, or terror phase. In this phase we have a most complex problem of socio-political interactions with military operations factors. Examination of some twenty case histories of insurgencies suggested that the principal variables in this phase are 'loyalty', information, and effective military force. These three types of variables comprise particularly complex interactions because they are all mutually interdependent, and because loyalty is so difficult to define and measure operationally.

Loyalty, information, and force were therefore chosen to be the principal problem variables of the manual game simulation. The principal actors or protagonists chosen were also of three types: Insurgents, Villagers, and Government Forces. These could easily be translated to simulate subversives, uncommitted population, and the legal authorities.

This combination of three types of interaction (loyalty, information, force) in various mixtures among three types of actor groups (insurgents, villagers, government forces) readily lent itself to manual gaming as the experimental method. Players could be expected to (and did) feel shifting loyalties, transmit or deny degrees of truthful or false information, and exert force where it seemed effective. A naturally absorbing and dynamic contest for the loyalty, intelligence information, and force support of the villages by the two belligerents (insurgents and government) promised both player involvement and motivation, and a degree

of realism in simulating the cross-pressures or 'double-binds' to which uncommitted populations are subject in insurgency.

The intrinsic nature of the competitive situation in these major variables forced the belligerents to make the difficult tradeoffs between military and political costs and gains that are so salient in counterinsurgency.

In sum, the needs of COIN research, the availability of the gaming technique, and the effectiveness of the particular variables in generating highly motivated behavioral experiments while simulating some of the principal problems of insurgency were the reasons for those variables being chosen for simulation.

4.2 How Well Does the Game Structure Fit the Intended Aspects of the Real World Situation?

The game structure was intended to simulate one kind of "terror" phase in insurgency--the transition from Mao's "Phase I" to "Phase II", expressible as the transition from subversion to guerrilla warfare. As such, the terror phase incorporates some aspects of both subversion and guerrilla warfare. Persuasion and coercion are used to gain information and recruits in villages. Selective terroristic killing of government administrators and hostile villagers is practiced by the insurgents. Villages may harbor spies and informers, for one or both sides are poorly informed on the general war situation. The government forces threaten and cajole and recruit, and are sometimes ambushed or they themselves may surprise the insurgents. The larger and more protracted an ambush, the greater the probability of its being betrayed. Secure ambushes provide force effectiveness advantages, but betrayed ambushes incur force effectiveness penalties.

The game specifically excludes such economic factors as food control, civic action, and bribery--all important factors in some case histories. It was the intent here to concentrate on those relatively more simple(but still very complex) situations where economic factors did not play a major role.

Communication among villages is possible, but somewhat delayed and unreliable, as might be the case in specifically rural insurgency. Urban (or suburban) insurgency would require an easily achieved modification improving ease of communication among populations.

The insurgents cannot compete openly and directly for political loyalty in the presence of government forces--they have become wanted revolutionaries, have gone underground and become outlaws. The government forces, on the other hand, cannot find or attack any fixed center of revolutionary occupancy, as they might attack a 'front' organization in the pre-violent political organization stage.

It must be emphasized that the game simulates only some of the salient situations in the terror-phase transition from subversion to guerrilla warfare. Subversion within the government and insurgent forces are not simulated (although intra-village conflict and defections may occur). Ambushes and patrols along roads between villages or in open country are excluded, to focus action on village intelligence and loyalties. There is no air support that comes in time to relieve an ambushed government force, as there well might be. And there is assumed to be no shortage of arms among insurgents. In short, the game concentrates on the variables of loyalty, information, and direct application of force, at the cost of excluding some other important factors. This appeared to be a necessary simplification for the exercising of a manual game with sufficient frequency for the identification of decision rules for the planned man-machine simulation. Players with field experience have nevertheless found even the simplified game useful in clarifying the relations among loyalty, information, and force.

The following table summarizes what the AGILE COIN Game is and is not.

WHAT THE AGILE COIN GAME

IS	and	IS NOT
A human player simulation of a few of the important local factors in the transition from subversion to guerrilla warfare.		A comprehensive simulation of all aspects of insurgencies in general, or of a particular insurgency.
A simulation of the interaction of political loyalties, military forces, and intelligence about loyalties and forces.		A simulation of the detailed tactics of counterinsurgency warfare or political subversion.
A simulation of a small number of small village communities responding alternatively to government and insurgent presence and demands.		A simulation of an entire country, or of the capital city of a country.
A simulation of coercion and counter-coercion using terror (threats of and simulated murder and abduction), impressment, recruiting, and protection.		A simulation of economic and ideological pressures and promises used to influence village populations.
A simulation of a few of the political responses to terror in the villages.		A simulation of the complete political process in villages.
Group training with maximum student participation (learning by doing).		A predictive technique for determining the real world outcome of certain combinations of variables and strategies.

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5. GAME DEVELOPMENT AND TEST

5.1 Development History of the AGILE COIN GAME

The AGILE COIN Game was continuously developed throughout the study period by rule changes and refinements after successive plays. After about the fifth play, the major changes had been made, but refinements continued after each of the remaining ten sessions.

The first set of rules involved considerations of food, as well as those of ambush, impressment, and terror. Rates for production and consumption of food were set so that village labor produced rather small margins; insurgents were heavily dependent on village food supplies; forces of either side left in ambush had to be fed before villagers; the government had access to mechanical harvesters to increase the efficiency of food production that could be given to villages, but government forces left in ambush required more food than insurgents left in ambush; and there was a time delay of unproductive activity before death when food supplies were less than consumption requirements. The belligerents could give or destroy food, release men for work in the villages, give or destroy harvesters, leave ambushes, and kill and impress villagers. Life was threatened by both killing and starvation. The first game was played by six villagers in the same room being visited alternately by the government and insurgent players and using various colored playing cards to represent people, food, and harvesters. In order to win, the insurgent was required to maintain the loyalty of four of the six villages for three consecutive moves; the government's objectives were to avoid the insurgent's winning; and villages had only to survive and attempt to accumulate food. These provisions are listed in detail in Appendix A.

The first play with these rules resulted in the belligerent's attempting to secure village loyalty by responding to their demands for workers and harvesters with primary motivation produced by desires for economic growth. Criticism of this game was focused on the lack of terrorism and the unrealistically perfect communications between the villages.

Before the second play, a major change in the rules was made by eliminating all considerations of food, based on the assumption that the game should be limited to situations where the food supply was of much less concern than acts of terrorism, impressment, and military engagements. To provide more realistic communications between villages, the players were spread out into two rooms, and contact was made by talking through open doors and eavesdropping. Further uncertainty was added by keeping secret the initial size of the insurgent force. Belligerents were no longer allowed to release their forces for work in the villages. The criteria for winning were changed requiring for an insurgent to win, the loyalty of 40% of the villages for 3 consecutive moves and a 20% increase in his starting forces and for a government win, the loyalty of 80% of the villages for 3 consecutive moves and a decrease of 20% in the starting force of the insurgent. The winning village was the one whose loyalty was toward the winning side at the end of the game and which had suffered the least loss of population. These win criteria remained roughly constant throughout the remainder of the game development.

Rules for the third playing of the game added constraints to the use of belligerent forces, by allowing villagers to resist imposed actions by giving them small but significant force effectiveness, by limiting impressment to 3 times the size of the visiting belligerent force, by requiring a training period of 2 moves before impressed villagers could become effective members of the belligerent's force, and by limiting the military use of trained impressed villagers to only those situations where an equal number of cadre were present. The role of the government village administrator was also introduced as a source of accurate information for the government about the village. However, the administrator could be killed by either the insurgent or the villager himself. At this point the administrator and the village chief were both represented by a single player. This switching of roles was subsequently found to be rather difficult, and additional players were provided to be government administrators for the eleventh and subsequent plays of the game.

Telephones with an intercom system were used to improve government communications with the villages for the fifth play, and the use of this system was continued until an outdoor game (the fourteenth) required the use of a courier for message delivery. The courier system provided more realistically delayed message transmission and written records of communications for post-game analysis, and the courier was retained for both belligerents (without the telephone system) for the fifteenth play.

Other rule refinements included imposing desertion rates for belligerent forces and keeping the quantitative values of the win criteria secret (game 11); increasing villager uncertainty about the rules by denying rule information about actions, rates, sizes, and force effectiveness values (game 13); and adding multi-man villages (game 6) with the chief elected by majority rule for intra-village politics (game 14). The rules for game 15 emphasize conflict within villages by assigning an equal number of the village population to each village player at the beginning of the game. In this situation, a village chief is still elected by majority rule, but village players have more autonomy because of their control of a specific portion of the village population.

Final game rules and material for game play can be found in Appendix B.

The final game is one of conflict between 3 groups: Villages, Insurgents, and the Government. It includes specific provisions for the following actions:

1. Expression of lovalty by villagers
2. Conflict within villages
3. Definition of winners
4. Changes of player resources
5. Military engagements including various levels of surprise
6. Casualty calculations including village cross-fire losses
7. Government and Insurgent recruitment and impressment of villagers
8. Village capabilities to resist belligerent actions
9. A system of Government administrators and a communications system

10. Courier services for both belligerents
11. Desertion from military forces
12. Constraints on force deployments
13. Propaganda
14. Training time periods from impressment to actual use in military actions
15. Return of conscripts
16. Ambush emplacement and warning
17. Reconnaissance
18. Individual villagers or village factions leaving to join belligerent forces
19. Spies
20. Counter-ambushes

Displays of the major game variables and events are maintained while the game is in progress. Displays and results of past games analyses are shown in APPENDIX A. A description of Game 15 follows.

SYNOPSIS OF PLAYER POLICIES

Game 15

The Government

The Government did not play a very active role in trying to win the allegiance of the villagers. Most of their efforts were concentrated on luring the Insurgents into an ambush or by wearing down the patience of the opposition. They impressed villagers in order to have leverage in forcing the villagers to be on good behavior, but village loyalty reports suggest that impressment efforts may have backfired, since the highest Insurgence sympathy was found in the village of earliest impressment, while the greatest Government loyalty was in Village C, where the Government impressed no troops at all.

Many players on both sides thought that the best Government strategy involved (at least in part) a large randomly roving ambush. However, as the Government's large-ambush policy lost credibility as an effective and convincing tactic, the Government lost allegiance in all villages except C and eventually placed more emphasis on smaller patrols.

In the post-game critique, all players were asked to select the most effective strategy for the Government, as well as its worst mistake. Individual members of the Government team supported a policy of:

Convincing one village by making protection contingent on loyalty;
"Get tough! (We didn't do enough of it)"
"Forcing options on people --forces a choice. Waiting paid off."
(Administrator) "Should show more interest in the villagers on one hand, be more aggressive on the other. Government too tactless with the villagers."
(Further suggestions): (Insurgent) "large moving ambushes"
(Villager) "be less vacillating"

The Government team thought its worst mistake was:

"Leaving ambush in a village of questionable loyalty"
"Being too soft once force had been decided upon"
"Betrayal of ambush at Village C"
(Suggestions): (Insurgent) Insufficient ambushes
(Control) "failing to deny Insurgent access to village"

The Insurgents

The Insurgents made a greater attempt at propagandizing and recruitment than the Government, stressing their loyalty needs and promising return of impressed troops. Their military tactics involved primarily a roving and probing force which occasionally clashed with Government troops. They sent out numerous one-man recon patrols, relying on these and village warnings to reveal government ambushes. The Insurgents left no ambushes in the villages, but performed a number of counter ambushes.

Additional components of Insurgent strategy were to:

1. Execute village administrators immediately, to deny the Government vital information and village contact. (There was seldom any village opposition to losing administrators. Village A preferred it as an aid to their playing both sides in the conflict.)

2. Reward loyal villages and punish neutral or pro-Government villages which continued to frustrate them in the latter stages of the game.

3. Stress the bestiality (but not weakness) of the Government while proclaiming its own military power (while neglecting to take advantage of its early counterambush victories).

The Insurgent team considered its most effective strategy was to:
"win military engagements"
"get tough "
(Further suggestions): (Control) "impress men as hostages to force good behavior"
(Villager) "avoid conflicts"
(Control) "use terror and impressment tactics more effectively"

The Insurgent team thought its worst mistakes were not publicizing military victories and in accidentally killing villagers. Control also mentioned missed information on government ambushes.

Village A Strategy

The objective was to play up to both sides, orient the village so that it could switch easily to the winning side, and try to keep both sides--especially the ambushes --out of the village (by telling the Government the village was trying to set up a rebel ambush for them to counterambush, and then telling the insurgents that the village was loyal and that no rebel ambush was necessary there). Efforts were also made to persuade the Government to release impressed men. Since neither side left off ambushes in Village A after the first few moves and both were led to believe in the village's professions of loyalty, there was little belligerent animosity towards it. Thus Village A contained 84 men at the end of the game, the highest total of the three villages.

Village B Strategy

Village B began neutral, trying to decide which would be the winning military force, Government or Insurgent. It changed to pro-Government when the Government showed signs of winning, but turned neutral when the Government vacillated and announced a general amnesty (a sign of weakness to the villagers). This defection frustrated and angered the Government forces. Meanwhile the insurgents were making little headway in this village. In the end, Village B remained neutral, but with a population of only 61 men, the lowest number. According to one member of Control, the attitude of B "finally wore both belligerents down and would have backfired with another round."

Village C Strategy

Village C Also began neutral but on move 8 switched to pro-government for the rest of the game. The Insurgents were very slow to start in the village: only twice did they visit with a force greater than two men, the first time to impress 20 men, the latter on a successful counterambush on the 15th move. The Insurgents became unhappy with the village strategy (despite scattered attempts by the villagers to prove loyalty), as one Insurgent message warned: "Need recruits, unless you cooperate, warn of ambushes, etc., we shall take stern measures." Village C ended the game with an intermediate population of 64.

Note: The complete formulation of three separate village strategies, itself, underlines one significant finding from the game development: multi-man teams play much more consistently to attain their objectives.

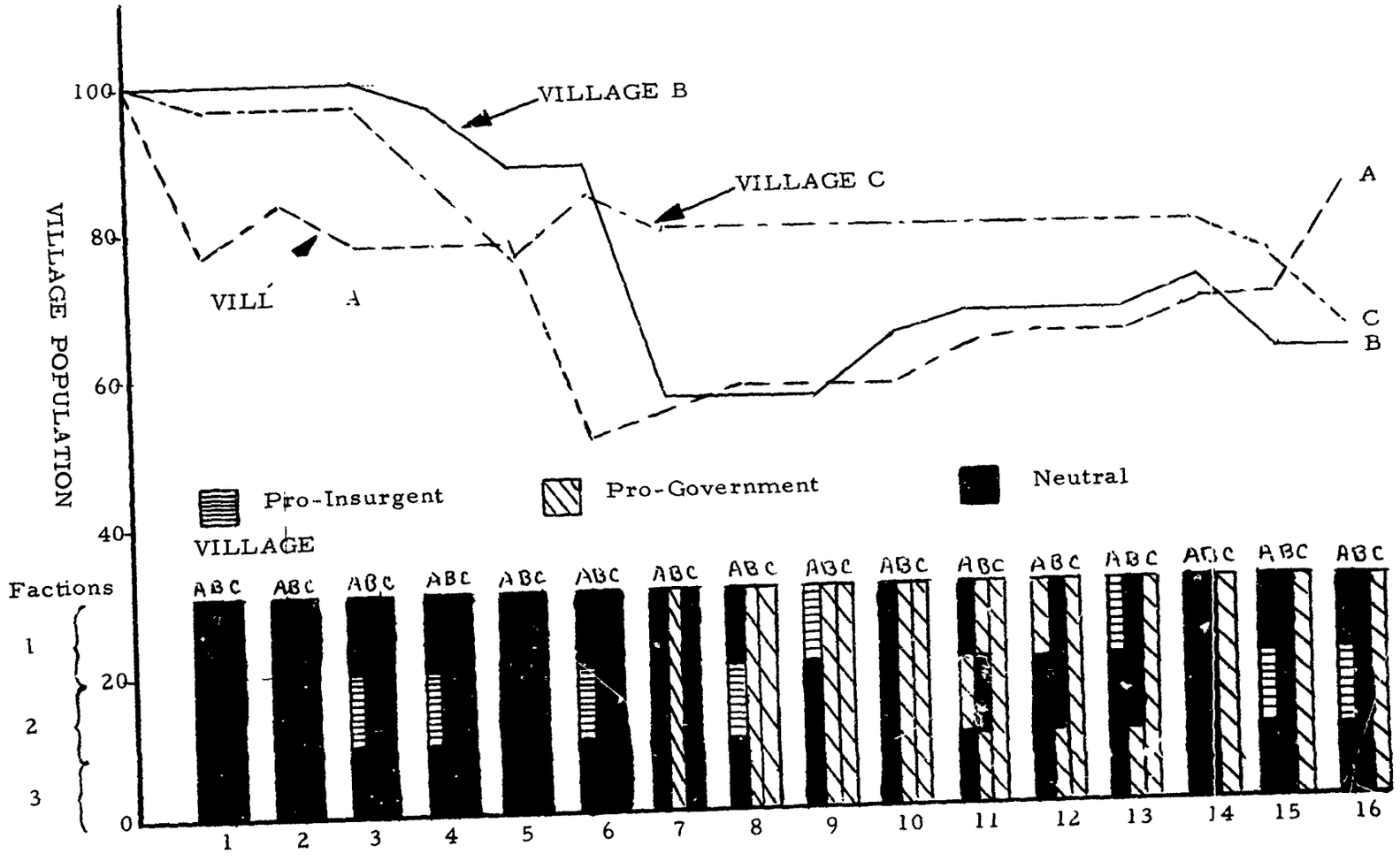
Game Result

The game ended in a draw, with Village C pro-Government, Village B neutral, and Village A 1/3 Insurgent and 2/3 neutral. The Insurgents had gained forces through impressment, but had insufficient success in winning popular loyalty.

The following graph displays the history of village populations and loyalties reported by each faction (player) in each village.

VILLAGE POPULATION VS LOYALTY

Game 15



5.2 Player Criticisms

The following pertinent criticisms have been raised:

1. There are problems of cultural limitation which affect principally motivation in the game, but also the structure:

   a. Western bias toward rationality, forms of justice, trust, independence, and his capacities for sympathy and empathy;

   b. American perceptions of common interests among villagers leading to coalition;

   c. American competitiveness;

   d. Villages have no empathy for the game's Government administrators and feel no terror with their death, if killed by the insurgents; they may even prefer to have him killed to facilitate plotting and intrigue.

2. An unrealistic aspect of the game is the somewhat artificial payoff (or win) for the villagers. In reality, their winning coalition with a temporarily strengthened insurgency might result in higher costs from government reprisals.

3. The present win criteria are unrealistic and should be modified to depend on relative improvement (as in a real slice of war). (Incorporated into the teaching game.)

4. Village coalitions are unrealistic as outcome determiners. Communications by courier rather than telephone and face-to-face contact between villagers has dampened this effect since game 10.)

5. Government and Insurgent inabilities to materially reward their supporters is a distortion of reality.

5.3 Uses of the AGILE COIN Research Game

The AGILE COIN game, simulating the terror phase of internal revolutionary conflict in a general rural country framework, was designed as the first step in assessing the feasibility of a computer simulation. However, as a by-product, the game appeared to be sufficiently realistic to be used as a training device.

The game as a training device provides high player involvement and consequently high learning potential. In addition, mistaken action, such as tactical maneuvers for military gain without allowance for political consequences, are punished quickly and the neophyte soon learns that he must attend to the political as well as the military problems.

Games can complement actual field experience by acquainting students with the cross-pressures felt by villagers and belligerents alike, by preparing them to ask the right kinds of questions in the field, and by exposing them to the consequences of ineffective or dangerous actions in the classroom rather than in the field. Materials for the school game are in APPENDIX B.

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6. RESEARCH FINDINGS

Increased understanding of IRC relationships has resulted from the experience of game design, operation, observation, and refinement, phased with the discipline imposed by flow-chart construction. The interaction of the major gamed variables of political loyalty, political and military intelligence, and military force, has also created a body of attendant relations expressing political and psychological perception, irrational responses to uncertainty, decision-making trade-offs and tactical and strategic preferences.

The following section presents these findings in two forms: One confirming well-known relations, and the other suggesting new relations. Finally, these research findings have been classified into major problem areas for further IRC research, with suggested hypotheses to investigate these areas.

6.1 Some Observed Relations

Structural relations among the variables emerging from the AGILE COIN Game are embodied and best displayed in the simulation flow charts in APPENDIX C. The relations between action and psychological factors, particularly those relevant to perception, motivation, intention, and trust, are suggestive by-products of manual games, and fruitful ground for hypothesis building.

The results of analysis suggest some of the relations between the major variables and reported village loyalty. While these results are of no statistical significance, and are not substantive from actual IRC situations, they do illuminate psychological factors important to the understanding of the motivational and perceptual phenomena of the decision-processes in IRC situations. Their usefulness is two-fold: In identifying biases in the decision-making process and in the interpretation of other's actions.

I. "Irrational" Factors Influencing Loyalty and Action

A. Threat to possessions (as established government or village) often leads to anger and involvement and consequent conservatism, fear to take risks for long-term gain.

B. Intolerance of neutrality evidenced in belligerent tendency to perceive all villages as in favor or against--leads to self-fulfilling prophecy of neutral's eventual hostility by anti-neutral behavior. (Well known in psychological literature.)

C. Belligerent tends to overestimate resources of opponent.

D. Once committed, villager interpretations of actions are strongly influenced by present loyalty. (Well known, but confirmed.)

E. Empathy for other villagers can determine loyalty unless overruled by competitiveness, sufficient reward, or loyalty influenced perception.

F. Protection is often sought on declaration of loyalty for one belligerent even though it raises other's suspicions and creates a target, drawing crossfire losses.

G. Village is always shorter-sighted than belligerent. (Reported, here confirmed.)

H. Terror often misperceived as retribution--senseless killing is not understood by Americans (and others).

I. Creation of team-feeling in village by sharing plans, intelligence, and strategy, influences loyalty.

J. When one belligerent counterambushes successfully, he usually has had the help (intelligence) of another villager. This tends to be interpreted by the villager at the scene of the engagement as political strength on the part of the counterambusher.

K. The imperfect communication among participants tends to result in an over-valuing of the available information, including attributions of rational strategic meaning to inadvertent errors.

L. People will react unfavorably to inconsistent behavior. Consistent behavior, almost but not quite regardless of how brash it is, will lead to more stable loyalty attitudes.

M. Initial tendencies to pledge and maintain loyalty rapidly give way to sets of actions which are aimed soley at self-preservation.

II. Variables Influencing Loyalty

A. Return of recruits--increased loyalty toward impressor (although net loyalty loss may remain).

B. Military Intelligence--Ambush outcomes

C. Inertia from past loyalty position (known)

D. Commitment to the impressor from manpower invested in recruitment or impressment (presumably through hope of returnees).

E. Principle or game-derived sense of justice

F. Administrators protected by ambush swing loyalty toward government--where ambush alone would not.

G. Visits as evidence of interest in village

H. Protection when village feels other belligerent distrusts it, increases loyalty for protector

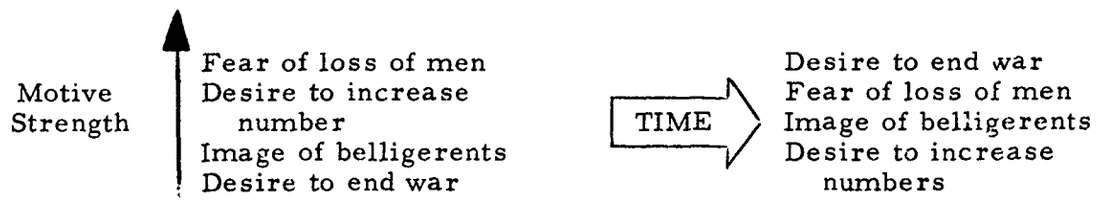
I. Threat of execution (murder) with evidence of intent (known, shown how important in game)

J. Empathy for actions in other villages

K. Crossfire further polarizes village loyalty

L. Coalition among villages moves all in majority direction

III. Motive Structure and Decision Criteria Ranking with Time



The rise of "desire to end war" on the winning side as a motive appears to follow closely the attrition of village population through crossfire and impressment, and thus failure in avoiding loss of men. Also significant is the increasing degree of partisan commitment with time and the sense that the only justification and solution for the villagers' loss of men is to take an active role in determining the winner, and to win.

IV. Observed Village Responses to Belligerent Action

Impressment--Loyalty rises for impressing belligerent if sense of commitment and hope of return outweight anger at loss of men; otherwise loyalty falls. Return of impressed men increases village loyalty unless more were promised than were actually returned.

Unspecified Threat--Leads to resistance and anger.

Specific Threat--of retribution or threat to kill men to induce loyalty change, information, etc., proved successful. When not in retribution, action as evidence of intent to carry out threats speeds result.

Execution--Without reason leads to resistance by villagers.

Presence of Belligerent--Ambush in a village influences initial commitments; after partisan declaration, crossfire and administrators become more important.

Crossfire--Losses resulting in displeasure sufficient to change loyalty further polarize village--change does not depend on who laid the ambush.

Evaluation of Belligerent Competence--is important in initial loyalty determinant weighting initiative, predictability, Insurgent attack on Government Hq. etc.

Example of other Villages--leads to empathetic response against terrorizing belligerent as often as warning of what might happen to observing village.

Participation--with belligerent increases loyalty toward him whether due to recruitment, intelligence offering, or harboring ambush.

Feedback--on belligerent plans and treatment as team-mate influences loyalty in favor of belligerent.

Extreme--forms of kindness or brutality are often seen by villagers as signs of weakness.

V. Loyalty-Shifting Behavior

Changing loyalty position results in servile behavior toward and expressions of loyalty for the belligerent decided against, which are much more pronounced than those for the belligerent actually favored. (Suspected, but surprisingly hard for the players to perceive, at least in the course of the game.)

VI. Variables Influenced by Loyalty and Intelligence

Loyalty and confidence strongly affect the availability, accuracy, and timeliness of intelligence.

Intelligence is useless unless rapidly exploited by effective plans and decisions (well known but shown how important in game).

Forces with good intelligence but few resources tend to dominate forces with superior resources but poor intelligence.

Unpredictable applications of political and military resources are the most effective (well known but shown how important in game).

Face-to-face meetings more effectively solicit loyalty and information than indirect communications (well known but shown how important in game).

The villagers respond to belligerent actions in reasonable terms of the villager's perception of the situation. However, different villagers may react differently to the same action. Likewise a given villager may respond differently to the same action at different times. For example, a village may consider that a certain belligerent action is justified at one point in the game, but not at some later point. The specific response to a given belligerent action depends on the interpersonal relationships involved (social, political, economic, etc.) and, to a certain extent, the villager's sense of "justice" (ideology).

6.2 Hypotheses for Validation and Test

The following eleven problems, about which many hypotheses may be formed, summarize the major substantive areas for research stemming from the analysis of AGILE COIN Game data:

1. What is the changing, best, and most timely, partition of political (loyalty) resources among political demands for popular decisions and conflicting military demands for information and security, as loyalties and powers shift with time? Political analysis has dealt with this on a static, instantaneous basis, but not with the dynamics.

2. What is the changing, best, and most timely, partition of military (fire-power and mobility) resources among political demands for "presence" and civil security, and conflicting military demands for risk-taking deceptions and ambushes, as loyalties and power shift with time? Military operations research has dealt with optimal force allocation under known utilities, but not where force utilities shift suddenly within subjectively distorted perceptions of power and reward structures.

3. What is the non-belligerent, uncommitted neutrals (villager or peasant) definition of victory? This must be operationally and behaviorally defined.

4. How do the non-belligerent neutrals know who is "winning", by their own definition of victory?

5. What effect do these concepts and perceptions of neutrals of gains and losses have on behavior in response to the actions of the belligerents?

6. What is the neutral awareness of "the rules of the game" for the belligerents--that is, of the constraints on their actions as a function of their degree of provocation?

7. What is the nature of the bandwagon effect? To what extent is loyalty affected by perception of who is winning? What is the force of the desire to be on the winning side, regardless of which side that is, as measured by the sacrifices of benefits it will induce?

8. What is the nature of the "reverse" bandwagon effect? In the game villagers tend to switch loyalties if their original side goes for a long time without any perceived progress. Will loyalty be attributed in a static case, with no progress? This is reputed to happen in U.S. labor unions.

9. How is strength perceived in factors other than military victories?

10. What is effect of actions in other villages? Military victories? Terror? Favoritism?

11. Which belligerent is blamed for collateral damage among neutrals (villagers) from a military engagement?

The first class of problems to emerge might be characterized as one of the dynamics of forces. Given the interactions of several mutually dependent political and military forces over time, there is the difficult class of problems concerned with such questions as how much of which force is enough to result in a given desired state of the system. These are essentially quantitative problems of reducing disparate types of forces such as loyalty and firepower to commensurables, determining net resultant forces from a set of commensurable vectors, and calculating the effects of timing in the interactions of forces(how much is too little and/or too late?).

The dynamics of forces problems may be explored and solved by analytic techniques, beginning with logical analysis using computer simulation, and building to mathematical analysis. The second class of problems are distinguished from the first in that they are factual rather than formal, and usually qualitatively expressed rather than quantitative. These are problems of the empirical nature of the substantive elements of internal revolutionary conflict, such as how various events are perceived by significant actors. Where the dynamics problem is to calculate the resultant of a given set of related political and military forces, the factual problem is to determine what the nature and strength of these forces actually is in real revolutionary situations. This data problem cannot be solved by analytic techniques, although analytic techniques can identify the most critical variables for which data must be collected. The data problem can only be solved by the collection and analysis of the data.

The manual game provides no statistics of great significance and serves only to identify alternative responses to gamed variables, criteria bearing on decisions, and requirements for data. It has, however, suggested

hypotheses worthy of "test" in the field and by simulation, which are listed below.

The possible hypotheses are of several types: those derived from real-world or game experience to be investigated in the simulation or to test the simulated model; and those suggested through simulation for real world validation. From the AGILE COIN game three sets of hypotheses have emerged:

I. Those expressing apparent relations in the game and deserving real-world validation;

II. Those expressing a subset of the possible reactions following a specific event, which deserve simulation and real-world experimentation to determine the input sensitivity and outcome manipulability;

III. Those expressing possible relations in the real-world for both simulation and data collection.

I. A. Belligerents perceive neutrals as in opposition:

B. Indiscriminate terror is misperceived as retribution.

C. Return of conscripts increases loyalty toward the impressor, but may still result in a net loss.

D. Collateral losses further polarize, but do not reverse, village loyalty.

E. Reprisal, in the form of killing men, at some low level results in anger and resistance; at higher level in submission.

F. Killing a government official in a village either favors or, at least, does not detract from the Insurgent image--i.e., is costless to the insurgent.

G. Broken promises are construed as weakness of the promising party.

H. Absence is interpreted as weakness and causes loss of loyalty.

I. Propaganda is discounted; but absence of propaganda is perceived as weakness.

J. Mutual village distrust increases monotonically with the overall level of terror.

II. A. Impressment results in:

Favorable loyalty to impressor through commitment;
Unfavorable loyalty to impressor through loss of men.

B. Reprisal in another village results in:

Favorable attitude toward reprising belligerent if viewed as warning;

Unfavorable attitude toward reprising belligerent if viewed empathetically.

(Why one view or the other is taken is unknown.)

C. Ambush deployment results in favorable loyalty shift if viewed as protection, and unfavorable if seen as an invitation to reprisal.

D. Direction of loyalty shift by village faced with purposive terror is determined by the credibility of the "terrorizer's" ability to maintain that terror level. (Strength vs opponent)

E. Neutrality under terror becomes less attractive only if one belligerent is perceived as winning; otherwise, neutrality is the only viable state, but often becomes an active playing off of both sides against each other.

F. Village losses greater than some threshold give rise to anomic behavior, or to fierce partisanship.

III. A. Partisanship of villages arises as war progresses and losses mount, because "winning" the war is the only justification for the dead.

B. Neutral villages are influenced by empathy and example, while committed villages are not.

C. Participation, coerced or not, by villager in belligerent planning, deceiving opponent, providing intelligence, or harboring an ambush increases loyalty toward belligerent--an accomplice effect.

D. Cohesive villages are much less bound by previous commitment to belligerent than factional villages and may swiftly reverse loyalty (less misperception of own interest or accelerating effects of agreement?)

E. Contact (visits, etc.) all by itself induces loyalty.

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7. MAN-MACHINE SIMULATION

7.1 Requirements and Applications

The objectives of military social science research in counter-insurgency are both basic and applied. A basic research objective is the improvement of theoretical understanding of military-political-social interactions in insurgency. Applied research objectives may include:

1. Training of military and other personnel dealing with insurgency.
2. Data collection requirements, priorities, sorting, and processing needs.
3. Action policy experimentation, generating and assessing the outcomes of alternative strategies under diverse military, political, and social conditions.
4. Intelligence collection requirements, priorities, and assessment.
5. Indicator identification and reporting, on the basis of improved theoretical understanding, data processing, and action policy experimentation.
6. Forecasting of probable results of current activities under specified conditions or changes.
7. Planning, or contingency plans generation, on the basis of improved theoretical understanding from basic research and the results of action policy experimentation, background data processing, and forecasting.

These research objectives, basic and applied, can be achieved more promptly and effectively through the use of manual gaming and computer simulation.

Training is a problem in learning. The findings of current education techniques research strongly indicate the need for active student participation, immediate reinforcement, role playing, and auto-instruction for rapid

and thorough learning to occur. These needs are met almost ideally by student participation in a manual game, such as the ARPA-AGILE COIN GAME, which is the closest possible training experience to actual "learning by doing" in the field. These human participation needs are obviously not met by all-computer simulation.

Data collection, for such complex socio-political processes as insurgency, is partly a problem in selectivity and subsequent concentration of collection resources. As in good reconnaissance practice, it is impractical to collect "everything about everything". To know what is most worth collecting is to know how to allocate collection resources efficiently. Efficiency of data collection is essential in the case of insurgency research, where field units are saturated with operational problems and have only very limited time to devote to reporting. To establish criteria of data "worth", an overall theoretical understanding of insurgency is essential. This understanding can be improved in the relatively unschooled by participation in the COIN GAME, but for sophisticated students of insurgency more precision and variable interaction capacity is needed before gains in knowledge can be achieved. This precision and capacity is possible with computer simulation of insurgency processes.

Action policy experimentation with games and computer simulations is a less time consuming, less critical, and less costly means for determining possible consequences of hypothetical strategies than actual field trials. More realistic complexity can be encompassed by machine simulation than by paper-and-pencil analysis. The biases of individual analysts can to some extent be cancelled or compensated by others' biases in multi-player manual games. The psychological mechanism of denial of unpleasant consequences may operate in individual analyses, but in a competitive game simulation the nastiest possible countermeasures will tend to be exposed. War gaming has been and continues to be the principal means of action policy experimentation. Unfortunately the great complexity of the political, military, and social issues of insurgency require either excessive limitation of scope or simplification of the content

of such games, or impractically large and complicated games. Computer simulations alone can remove these information capacity limitations, but only at the cost of the direct accessibility flexibility, and human behavioral interaction of the manual games. A combination of manual gaming and computer simulation--man-machine simulation--overcomes the limitations of either exclusive approach.

Intelligence collection requirements and priorities are a function of the relative significance of various military, political, and societal capabilities and intentions. This relative significance can be determined by subjective judgment, or by scientific reasoning, or both. Scientific reasoning is obviously desired, and it must be based on validated theory concerning the actual processes of insurgency. These can be observed empirically and analyzed during and after the fact, or observed and analyzed experimentally before they occur with hypothetical simulations. Simulation is the only scientific means by which the theoretical understanding necessary for intelligence requirements formulation can be developed for hypothetical insurgencies that have not yet occurred.

Indicator identification forecasting, and planning, like intelligence collection requirements, depends on the theoretical understanding of hypothetical insurgencies that can be developed through simulation.

The following table shows some of the advantages and limitations of manual gaming alone, all-computer simulation alone, and the combination of the two in the form of man-machine simulation. Apparently only man-machine simulation can accomplish the above requirements and applications of insurgency research, without the limitations inherent in manual gaming or computer simulation alone.

Advantages of Manual Gaming	Advantages of All-Computer Simulation	Advantages of Man-Machine Simulation
--direct user access	--precise quantitative accounting of all interactions and events	--direct user access
--human behavioral involvement and experimentation	--very large amounts of data processed rapidly (could exercise large number of independent actors).	--precise quantitative accounting of interactions
--rapid, cheap modification	--rapid, relatively cheap large number of plays needed for statistical significance	--human behavioral involvement and experimentation where proven theory is not yet available
--direct observation of results of decisions	--good control over variables under study	--large number of independent actors each exercising many variables can be processed and recorded
		--statistical significance can be achieved by very large number of plays at acceptable costs.
		--direct observation of results of decisions
		--good control over variables
		--rapid modification and expansion capability

Limitations of Manual Gaming	Limitations of All-Computer Simulation	Limitations of Man-Machine Simulation
--small number of independent actors	--no direct complete access by non-technical users	--only time, money, and imagination available
--many qualitative variables	--absence of experimentation with human behavioral responses	
--difficult to control variables	--slow relatively expensive modification	
--poor accounting of complex interactions and events		
--statistically significant number of plays very expensive.		

7.2 ARPA AGILE COIN Game as a Man-machine Simulation

To investigate the feasibility of taking advantage of the benefits offered by computer assistance, the game was converted to flow charts, suitable for programming and designed to permit variable degrees of human participation in the simulation. The results of this work are presented in APPENDIX C.

Before building the simulation, we must decide on how it will be used--be several people interacting simultaneously--or by only the computer's running many games for statistical purposes. In converting a game to a closed simulation for statistical runs, we can take advantage of this knowledge of its use to structure the flow chart logic and mathematics for convenience of programming. When several players are going to interact continuously with the simulation, different and novel methods must be employed. The AGILE COIN game is to be used for research for understanding and controlling insurgency, and we do not yet know how to describe the phenomenon in a simple set of equations. We have therefore constructed an open simulation which can be "taught" and which can teach by interaction with experts. In addition, we have had to simulate the actors so that the machine can play the positions not manned externally.

These considerations led to structuring the simulation around the men right from the start, rather than introducing the men after the simulation was constructed. This method avoids the pitfalls of incorporating logic from which the expert is excluded. Three modes of interactions were considered in the flow chart design--an analyst mode, a player mode, and a machine mode.

In the analyst mode an expert is allowed to teach the simulation to respond correctly. The expert is given the identical set of information as the simulation and is asked to choose an action or response. If the expert chooses differently from the model, he is interrogated to see why he chose as he did. This process may result in new logic or a resetting of decision parameter weights. In the second mode of man-machine interaction, the player-mode, the player is treated like a game participant and receives no more information than he would in a game. The simulation responds to his actions, loyalty settings and communications impassively, merely setting corresponding variables.

In the third or machine mode, the simulation plays all parts. In this mode the simulation must respond to the situation, react realistically and may even modify its behavior over time. Characteristic player personalities can be provided parametically, and determines how he will act, how fast he will learn, what general policy he will follow, etc. As many personalities can be simulated as desired.

One other requirement in designing the simulation was the development of the displays to a state that the men could easily digest the information and react to it swiftly. A further refinement finds the machine needing to stimulate the men or analyst, and this is done using the Socratic dialogue technique in which the computer asks the questions or provides sets of alternatives and asks the player to respond. This form of interaction requires careful attention in simulation building to the information needs of the men at each step of the logic. The flow charts are designed to show the man-machine interactions and information flow. The variables have been designed so that communication from man to machine can be easily translated into variable settings.

8. THE SIMULATION

8.1 Variable Identification

8.1.1 The Process of Game-to-Model Transformation

Even the most structured sort of game involving human players has implied elements. Besides the rules and procedures which are outlined by the referees and written instructions, there are unwritten, unspoken, and unthought-of constraints and bounds on the players. People are bound by the conventions and rituals of ordinary human interaction. A computer has no knowledge of these bounds, nor does a mathematical model, and for this reason, the process of proceeding from a game to a simulation can also be described as one of extraction of more and more of the implicit rules of the game, or of going from an implicit to an explicit structure.

To begin building a simulation from a game, we extract the most explicit structure and variables available. These are the variables concerned in making displays and those passed between or among players in written form. In the AGILE-COIN game, such variables as ambush presence and size, loyalties, populations, and administrator presence were isolated in this manner. The variables used in determining the winner of the game were also isolated, for the determination of the victor is among the most structured parts of the game. Extraction of these very obviously important variables is easy, for they appear again and again in communications, discussions, debriefings, and in the rules.

An attempt was made at isolating some components of the decision-making process by correlation of input actions and information, and observable decisions. This was done in the model development by charting the obvious variables and attempting to justify various hypotheses about actions and their effects. At this point it was possible to use the initial manual play-through of the preliminary simulation to discover more of the implicit structure. Experienced players were used, and the game developed in a manner similar to an ordinary game, except that there was no secrecy involved, and all decisions were made in as methodical and straightforward a manner as possible. The game was conducted in a Socratic manner by control with each participant describing his mental processes and actions as clearly as possible. Several games of this sort were played to extract enough information about the structure and processes of the game to build a preliminary flow-chart model. At this point, the flow charts were checked through for accuracy and "reasonableness", and

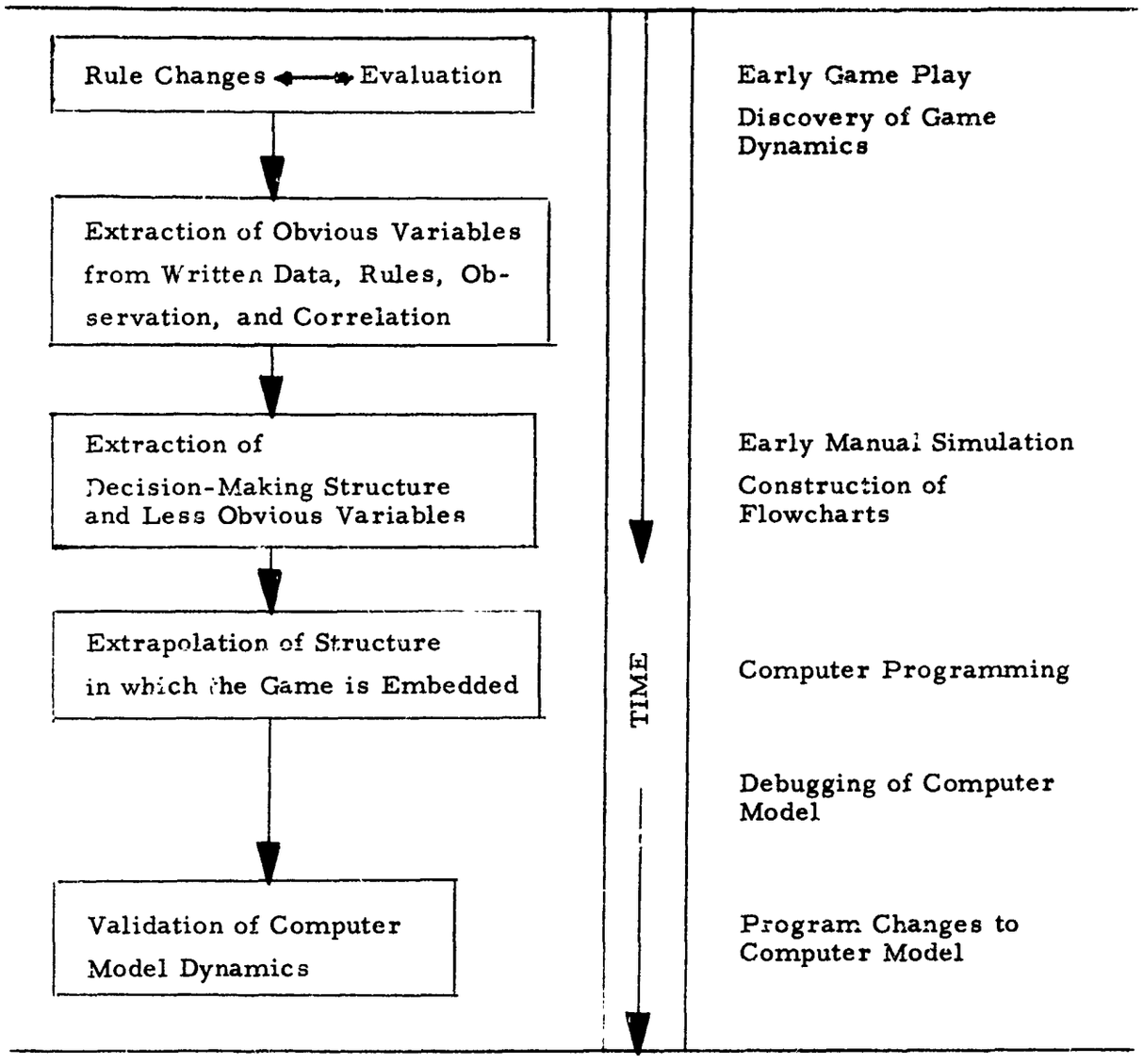
changes and corrections made. More play-throughs and corrections took place and the model became increasingly quantitative.

The flow charts and equations and the changes and corrections that have been made in them up to this point have been educated guesses about the nature of the game. The game is a "black box" analogue of the actual situation, responding to inputs as would the real situation similarly to but not one-for-one with the real world processes. The flow charts, therefore, are rough descriptions of the analogue to the real situation, and cannot be tested very rigorously for the dynamics that have characterized the game. The process is illustrated in Figure 8.1.1.

Once the model has been programmed and is running on the computer, the dynamics must be evaluated all over again by the expert players and the area experts. This evaluation is, of course, more easily and quickly done than the original game validation due to the comparative ease of making many computer runs as opposed to holding game sessions. Evaluation is also easier due to the fact that the game exists as a model for comparison.

Figure 8.1.1

GAME-TO-SIMULATION PROCESS


Rule Changes ⟷ Evaluation
Extraction of Obvious Variables from Written Data, Rules, Observation, and Correlation
Extraction of Decision-Making Structure and Less Obvious Variables
Extrapolation of Structure in which the Game is Embedded
Validation of Computer Model Dynamics
TIME
Early Game Play
Discovery of Game Dynamics
Early Manual Simulation
Construction of Flowcharts
Computer Programming
Debugging of Computer Model
Program Changes to Computer Model

8.1.2 AGILE-COIN Game Model Variables

In the AGILE-COIN game, there are three main types of variables; State variables, Strategy variables, and Temporal variables. The State variables are those which define the state of the game at any point in time. They can be used to provide a "snapshot" of the situation at any point during the game. State variables are divided into three categories. Physical State variables define easily quantifiable states such as populations and ambush sizes--those variables which are concrete and easily measureable. The Intangible State variables might also be called the qualitative State variables. They exist in the minds of the players or as indices relating volumes of propaganda, relative needs, utility scales, and so on. Historical variables are those variables of both previous categories which have an additional dimension of history attached to them. They define not only a point in time, but also a historical progression to that point in time. These are the variables which enable the model to learn by adaptively reprogramming itself and provide trends as inputs to the learning process.

The Strategy variables are those variables which refer to the player's plans and criteria for decision-making. Given the State variables as input, the Strategy variables as the criteria for decision-making, action is the output. The Strategy variables are of two kinds, Objectives and Weights, and Plans. The first kind determines the second, and the second kind determines the actions to be taken.

Temporal variables are those which are meaningful only in a particular action situation. They are not saved, except as they are "remembered" in the player's historical variables. Their dimensionality is small, for there is generally only one action situation at a time--village entry situation. (The other possible action situation which would be occurring simultaneously is the assassination of a village administrator by the village in which he is a resident.)

See Section 8.1.3 for a list of the presently isolated AGILE-COIN game variables.

Experience with large-scale models has shown that early in the specification of such a model, a rigorous method of variable name definition must be employed. If there is no standard system of defining variable names, the problem of remembering what the various designations mean becomes all but insurmountable. This problem is particularly acute when more than a very few people are involved in design and variable definition. Each individual may have his own consistent method for defining variables, but trying to add together a number of internally consistent systems which are not consistent with each other will result in chaos.

A useful formal name definition system is one which enables the user to learn something about a new (to him) variable upon first seeing it. The system should not be so complex, however, that learning to use the system will take the user as long as it might to look up the names of the variables in an unstructured system. Furthermore, the names should be so defined that the process of going from the manual simulation to the computer simulation is as simple as possible.

When deciding on a variable format for the AGILE-COIN model, it was felt that the most important factor to be emphasized--one that should be evident when describing a variable--was the "class" of the information contained. The classes are Real, Transmitted, Perceived, and Delayed (See Figure 8.1.2A). In game play, the differences between these classes of variables were found to be quite important. Real variables define the actual measurable levels of the quantities, to which they refer. Perceived variables are player's estimates of the state and other variables. Their settings may be the same as the settings for the real variables, or different, reflecting the difference between the real world and the way it is perceived by the people in it. Transmitted variables refer to the information passed between one player and another, and may be different again from the real and the perceived values for the variable. A fourth and more specialized class of variable is the Delayed class. These are the variables passed on to the government by the government administrators, and are delayed by control to reflect the fact that information transmission and processing takes an appreciable amount of time.

Figure 8.1.2A

EXAMPLE OF INFORMATION CLASSES

Class	Variable	Example
Real Variable	BSIZR (Insurg) = 50	The Insurgents have a force of 50 men.
Transmitted Variable	BSIZTV (Insurg → 3, Insurg) = 70	The Insurgents tell Village 3 that they have 70 men.
Perceived Variable	VSIZPB (3, Insurg) = 70	Village 3, a pro-Insurgent village, believes the Insurgents.
Transmitted Variable	VSIZTV (3, 7, Insurg) = 80	Wanting to help the Insurgents, Village 3 transmits an exaggerated report of their strength to Village 7.
Perceived Variable	VSIZPB (7, Insurg) = 55	Village 7, a pro-Government Village, places little faith in Village 3's report.
Transmitted Variable	VSIZTB (7 → Gov, Insurg) = 55	Village 7 gives the Government its estimate of Insurgent strength.
Perceived Variable	BSIZPB (Gov, Insurg) = 52	The Government discounts Village 7's estimate slightly.

Definition in these terms, classes of information, implies an actor for transmission, a perceiver for real and perceived information, and a reporter for the delayed administrator information. It is therefore necessary to define the actor or perceiver or sender when defining the class of information. This is done in the variable formats.

With the actor and the class of information, we must define the recipient or the perceived party involved. With these three facets of the variable defined by the structure of the name --the actor, the recipient, and the class of information--the user has a great deal more information, and useful information, than he would have gotten from looking at a variable name which had been made up in an unstructured way.

To meet the criterion of ease of transference from manual simulation to computer, all the variables have been defined as having no more than six letters. This has been done because of the prevalence of 36-bit computer words (a 36-bit word can contain six alphanumeric characters) in large-scale computers of the sort which might be the vehicle for an AGILE-COIN simulation. The variable format structure is shown in Figure 8.1.2B.

This section has described variable name make-up. The next section (8.2) describes the way in which variable index scales are defined and used in the simulation.

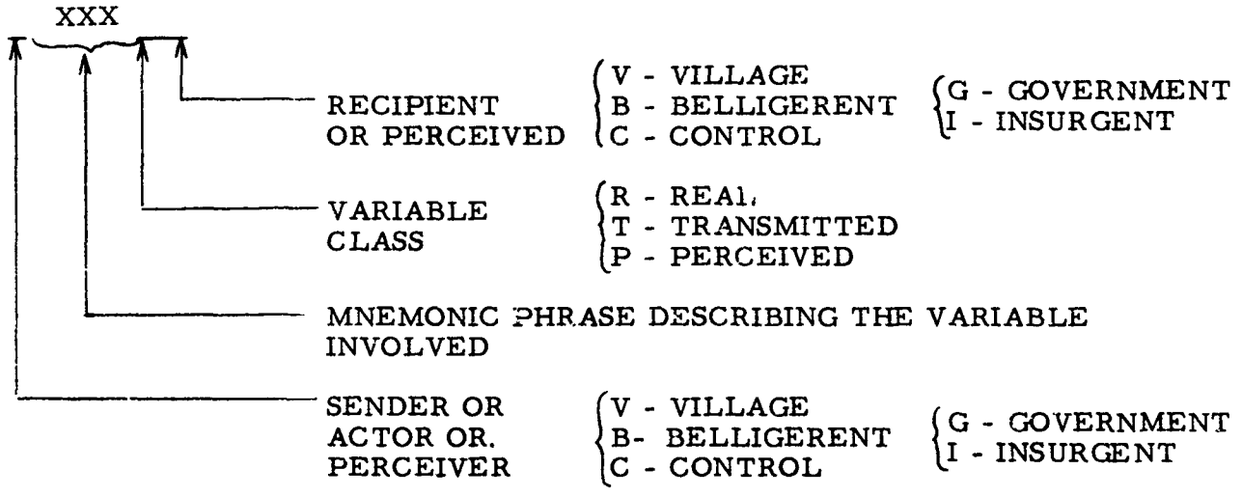
Figure 8.1.2B

VARIABLE FORMAT
AGILE-COIN MODEL

All variables names are six or fewer letters. The first letter refers to the sender, actor, or perceiver of the variable. The second through fourth letters are a mnemonic phrase describing the variable. The fifth letter describes the information class. The sixth letter (if present) refers to the recipient or the party perceived.

Refer to Figure 8.1.2A for examples of the actual mnenomic employed, e.g., B-SIZ-R indicates SIZE (SIZ) of Belligerent (B) force and is a real (R) variable. V-SIZ-PB indicates the Village's (V) perception (P) of the SIZE(SIZ) of the Belligerent (B). The reader is urged to work out the next one for practice and understanding.

The Six-Letter Variable



8.1.3 Variable List for the AGILE-COIN Model

AGILE-COIN GAME PRELIMINARY VARIABLE LIST

Typology of Variables

State Variables - define "state" of game at any time

a. Physical variables--objectively measurable, concrete, --- physical

b. Intangible variables--define states of mind; non-directly measurable quantities

c. Historical variables--dynamic variables defining experience of players in the game

Policy Variables - define plans, etc.

a. Objectives of players

b. Plans of players or strategies

Temporal Variables - apply to one situation at a time as entering a village; non-operational for non-action situations

Class	Type	Name	Definition	Dimensions
State	Physical	VPOPR	Village population real	# villages
		VPOPPV	Village population perceived by contiguous villages	8 contiguous v's x # villages
		BPOPPV	Village population perceived by belligerents	2 bellig x # villages
		VPOPTV	Village population transmitted to contiguous villages	8 contig. v. x # villages
		VPOPTB	Village population transmitted to belligerents	2 bellig x # villages
		APOPDG	Administrator report (delayed) of village population	# villages
		BSIZR	True belligerent size	2 belligerents
		BSIZPB	Belligerent perception of opponent size	2 belligerents
		VSIZPB	Village's perception of belligerent size	2 bellig x # villages
		VSIZTV	Village-to-Village transmitted estimate of belligerent size	8 contig v's x # villages
		VSIZTB	Village-to-belligerent trans. estimate of belligerent size	2 bellig x 2 bellig x # v's
		BSIZTV	Bellig-to-village transmission of belligerent size	2 bellig x 2 bellig x # v's
		BSAMR	Actual ambush size	2 bellig x # villages
		VSAMPB	Village-perceived size of ambush in contig village	8 contig v. x 2 bellig x # v's
		BSAMPB	Bellig-perceived size of ambush in villages (including own ambushes)	2 bellig x # villages
		GADMR	Presence of govt admin	# villages
		VCHFR	Village chief indicator	# villages
		VCONR	Village contiguity table	8 contig x # villages

Class	Type	Name	Definition	Dimensions
State	Intangible	VLOYR	Village loyalty real	# villages
		VLOYPV	Village-perceived contig village loyalty	8 contig v's x # villages
		BLOYPV	Belligerent-perceived village loyalty	2 belligerents x # villages
		VLOYTV	v -to-v transmitted loyalty	8 contig v's x # villages
		VLOYTB	Village-to-bellig transmitted loyalty	2 bellig x # villages
		BLOYTV	Bellig-to-village transmitted loyalty	2 bellig x # villages
		ALOYDG	Administrator report (delayed) of village loyalty	# villages
		BPRPR	Volume of propaganda per village	2 bellig x # villages
		VPSYR	Village psychological type parameter list	# parameters x # villages x # groups/village
		VPXAR	Probability of village assassinating administrator	# villages
		VCNFR	Intra-village conflict level	# villages
		VPRAR	Probability village requests ambush	# villages
		BFNEPB	Belligerent force needs as perceived by belligerent	2 bellig x 2 bellig
		BFEFR	Belligerent force effectiveness/situation	2 bellig x 4 situations
		VFEFPB	Village's perception of belligerent force effectiveness	2 bellig x 4 situations x # v's
		BBIAR	Bias factors for belligerent perception	4 factors x 2 bellig
		VPARR	Probability of village argument	# villages

Class	Type	Name	Definition	Dimensions
State	Historical	VLOSR	Village population losses to date	3(2 bellig + cross-fire) x # villages
		BLOSR	Belligerent losses to date	3 (amb., ctr.-amb., village action x # villages x 2 bellig
		BLOSPB	Bellig perception of	3(amb., ctr.-amb., village action x # villages x 2 bellig
		BINTPV	Belligerent perception of villages as intelligence sources (2 scales)	2 scales x 2 bellig x # vill
		BAMLR	Belligerent ambush left in village last move key	2 bellig x # villages
		BHSTR	History of action toward villages	# vill x 2 Bellig x # actions
		VREQR	Village request history	# villages x 2 bellig x # req. x time
		BWINR	History of engagement winners	# engagements
		BHOSR	Record of hostages (recruited and impressed forces) held by bellig	# villages x 2 bellig
		VHOSPB	Village perception of belligerent-held hostages	# villages x 2 bellig
		BHOSTV	Bellig-transmitted info about number of hostages held	# villages x 2 bellig x 2 bellig
		BRESPV	Bellig-perceived record of village resistance	2 bellig x # villages
		VWRNR	History of village warning	2 bellig x # villages x time
		BHSTPB	Perceived opponent history of action toward villages	# vill x 2 bellig x # actions x time
		BPLYPV	Previous perceived loyalty of villages by bellig	2 bellig x # villages

Class	Type	Name	Definition	Dimensions
Policy	Objectives	BWCRR	Belligerent win criteria	2 (pop + loy) x 2 bellig
		VWCRR	Village win criteria	2 ( )
		VWCRPB	Village perception of bellig win criteria	2( ) x 2
		VWCRPV	Village perception of village	2( )
		BIDLP	Belligerent ideal variable settings	2 bellig x # v'bles desired
		VIDLP	Village ideal variable settings	# villages x # v'bles desired
		BVCRTV	Village win criteria as transmitted by bellig	2 bellig x # villages
		BBCRTV	Belligerent win criteria as transmitted by bellig	2 bellig x # villages
		VVCRTV	Village win criteria as transmitted by village to contiguous villages	8 contig v's x # villages
		VBCRTV	Bellig win criteria as transmitted by village to contiguous villages	8 contig v's x # villages

Class	Type	Name	Definition	Dimensions
Policy	Plans	BSTRR	Strategy weights for bellig	2 bellig x # policies x # actions
		BSTRPB	Perceived opponent strategy weights	2 bellig x # policies x # actions
		BIMPR	Importance to bellig of visiting particular village	2 bellig x # villages
		BPEFR	Potential entry force size	2 bellig x # villages
		BDT#R	Belligerent decision tables # 1 to # 4--see flow charts	varying--see flow charts
		CLDER	Control (nature) graph of losses versus duration of encounter	2 actors x 3 coefficients
		CCFLR	Control graph of village cross-fire losses in encounters	3 coefficients
		BADWR	Belligerent action decision weight table	# vil x 2 bellig x # actions
		VADWR	Villageaction decision	# vil x 2 bellig x # actions

Class	Type	Name	Definition	Dimensions
Temporal		BEFSR	Belligerent entry force size	1
		VEFSPB	Village perception of entry force size	1
		VRESR	Village resistance key	1
		VEXLP	Perceived expected village loss if resistance takes place	1
		BEXLP	Perceived expected belligerent loss if resistance takes place	1

8.2 Some Typical Scales of Reference in the Simulation

The model centers around the interaction (action-reaction) of belligerents and villagers. The model design problem posed by this condition is how to organically drive the whole complex of variable actions and responses, intelligence and decision-making. The game description as a sequence of decisions to act or not to act seems most appropriate, with the input actions and intelligence being additively scaled and at some threshold determining the response. Strategies of belligerents and personalities of village factions are then expressed in the pattern of weightings of input variables and intelligence, and thresholds for adoption of various responses. This design poses some problems which are discussed below, but its major justification stems from its organic relation to the stress of appropriate reaction using all available knowledge.

The derivation from the manual games of variables and alternative responses will identify the structure of the gamed coercion-persuasion phase of insurgency. A major problem remains in the integration of the relevant information (events and intelligence) bearing on decision between the available alternatives. The strategy elected for solution has been two-fold. First, through a man-machine game and a complete simulation, selection of any problem area (e.g. village reaction to impressing) is possible for further detailed study. Thus, hypotheses concerning saliency and perceived relations to a villager may be investigated through the man-machine game, while sensitivity to any subset of all the inputs bearing on the particular event and its evaluation could be attained through the complete simulation. Ends--Means analysis with simulation of a particular country (characterized through the initial parameters) might evaluate the weightings of the possible inputs which give the outcomes most relevant to the country under investigation.

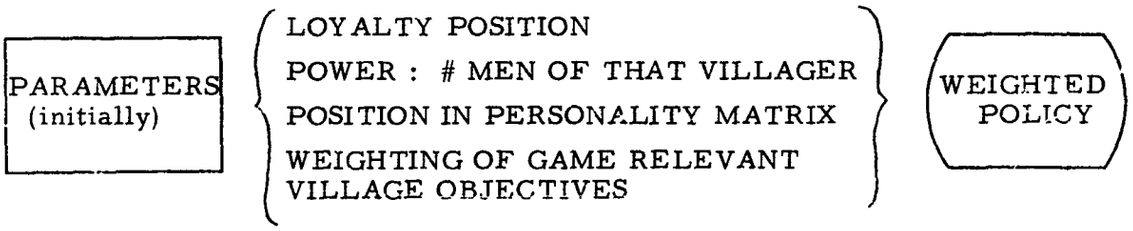
Second, evaluation of relevant inputs (identified through the game) is tailored to allow the maximum feasible complexity and the maximum scope for hypothesis testing. Maximum complexity would have all variables interacting conditionally and every possible situation would be spelled out

completely. Such a condition remains beyond our knowledge and would obviate any hypothesis testing. The simulation attempts to scale those factors that are additive at the first-order level and treat conditionally only those that are conditionally related at the first-order level. Even under this restraint, the machine will consider many more inputs to each decision than human players under stress of time measure. Further, the alternatives and decision criteria (relevant inputs to particular decisions) for all actions have been abstracted from the manual game, and hypotheses have not been "built into the flow chart"; possibilities have. Hypotheses may then be tested by varying the values and weightings of selected inputs and the thresholds for selected alternatives in a systematic fashion.

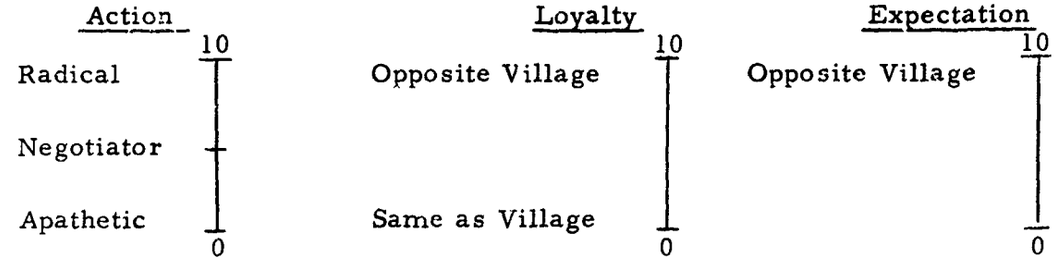
Ability to design these interacting scales of reference meaningfully thus becomes an important point. Scaling per se raises validity problems simply because human variables are so rarely strictly additive. The scaling approach, however, has been fruitfully used to describe personalities and we have incorporated this concept in characterizing villagers in order to determine their strategy (and in evaluating conflict levels). The crux of the validity problem and "meaningfulness" rests on the necessity to measure sufficient dimensions of personality (or factors relevant to the decision). We have used the game to suggest the factors relevant to particular decisions and have scaled the first order additive factors to evaluate them. Where manual performance of the flow chart illuminates flaws, conditional relations are available to correct them.

For example:

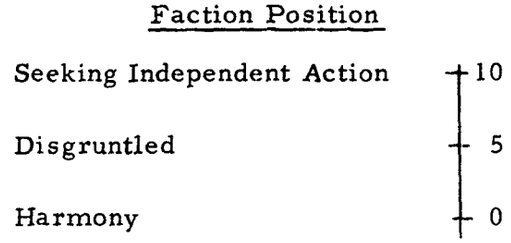
Villagers are characterized as:



Suppose we wish to derive the position of each village faction using basic scaled variables. Let us assume that village position can be described for each faction as a weighted sum of Action Motives, Loyalty Position, and Desired Village Objectives or expectations. Let us represent each of these variables on a scale from 0 to 10 as follows:



Let us define the faction position scale (the difference in position between a faction and the village) as follows:



In the mathematical equation form we might write:

$$F = a * A + b * \Delta L + C * \Delta E$$

where

F = Faction Position

A = Action

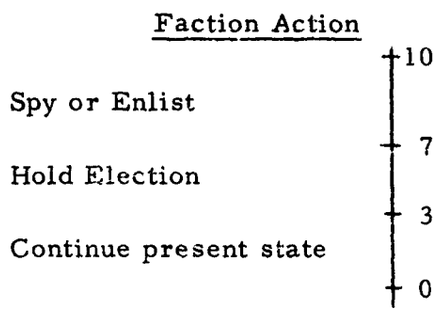
ΔL = difference in loyalty between faction and village

ΔE = difference in expectations between faction and village

and a, b, c are weighting fractions depending on the personality of the faction.

The Faction Position Variable would be treated as one of three inputs to the Faction Action Routine along with the length of time that the Position has been maintained, and the lack of cohesion of the village as a whole.

The Faction Action Scale can be described as follows:



and this variable will trigger corresponding action routines according to the settings. Utility settings 3 and 7 act as decision thresholds for election, leaving the village, or spying.

Loyalty Routine for Computer Simulation

The loyalty rating of a village is given by:

$$L = t/n\ (ax + by + cz + ew)$$

$$n = a + b + c + 3$$

where a = f(time); the sensitivity may be set for any number of cycles--the length of time may be influenced by belligerent actions

b = constant

c = constant

e = f(belligerent activity)

and x = level of previous loyalty

y = perceived level of belligerent power; must exceed some threshold of inequality

z = The average of all perceived information received about other village loyalties.

t = terror reaction; setting may be from zero to factor yielding L = 10

w = table of weights correlated with actions selected and added according to belligerent activity within the village; see table of actions--weights and village flow charts. Different villages will have different responses, a factor of individual characters of each village, to belligerent action in the village.

Village loyalty is arrived at by consideration of a number of factors. Briefly, these are as follows: level of previous loyalty, perceived belligerent force, perceived content of relevant information from other villagers, belligerent actions in village, and application of terror to the village. Factors which are not included in loyalty calculations at this state are those of propaganda (belligerent promises) and "personality" of belligerents.

An individual player or group of villagers calculate their loyalty according to a complex of considerations. Not all possible factors which influence loyalty always play a part; some potential factors, because of the particular course of the particular game, may not appear in a particular calculation. An example of this observation would be the situation in which a village is not visited by belligerents during two moves (one cycle). In terms of the village's experience, only the potential other factors such as information from other villages and past loyalty will weigh most heavily in the loyalty calculations.

In terms of historical loyalty, a village will maintain its loyalty at the same position until such time as belligerent action and/or fatigue, and the desire to bring the conflict to some sort of resolution, causes loyalty to change.

The fatigue factor is represented by the fraction a. The variable "a" may be set to have a short cycle which may represent a village in which historical loyalty does not come to weigh very heavily, relatively, in that village's loyalty calculations.

A different sort of village, one in which past loyalty overweighs all other factors would be represented by setting "a" to a high number and having it cycle at fairly long numerical intervals.

Another factor which may weigh in calculation of loyalty is the perception of belligerent force or size ("y" in the equation). Beyond some threshold, size of force influences loyalty considerations. However, the threshold changes as the villagers become accustomed to a particular-sized force.

In addition to past loyalty and perception of belligerent force, three other factors: belligerent action in village, information from other villages, and terror may weigh in determination of loyalty.

Information from other villages ("z" in the equation) may weigh in loyalty determinations, especially if there is a heavy consensus in one direction. Further, the village loyalty may be influenced by reports from other villages of particular belligerent activity, especially if the village can empathize because of having experienced the particular type of incident reported on. This variable will utilize in addition to factors of credibility and concensus group size a table of loyalty weights of belligerent actions in villages.

Belligerent action in village ("w" in the equation) has fairly obvious implications in village loyalty. Some actions, such as execution of villagers, will increase the fraction e/m to an important degree; different action will load this factor to varying degrees. If a belligerent enters the village and does nothing more than just enter to look around, village loyalty will not be as much affected as it would have been had the belligerent undertaken extensive actions within the village.

The last factors in the loyalty equation, "t", is the terror reaction factor. Resulting from belligerent acts which terrorize the villager, such as extensive executions, the village loyalty will behave in an extraordinarly eratic manner. Loyalty may freeze at neutral for a number of moves, or may align totally for or against the injuring active belligerent. These reactions each have a logic of their own. When punished the village may decide that it is unwise to be anything but totally loyal to the injuring active belligerent, or it may be so outraged as what it views as unjust injury, that it assigns its loyalty completely to the other belligerent.

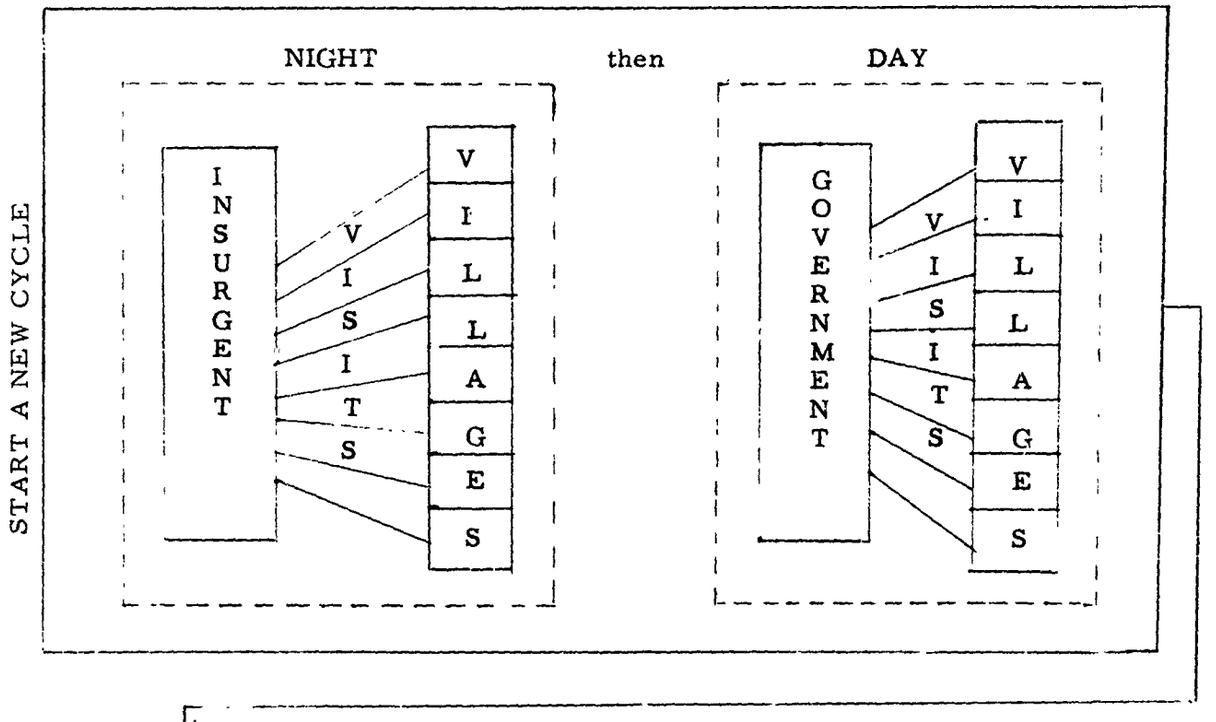
8.3 Logical Model

8.3.1 Introduction

As part of the feasibility study aspect of the ARPA-ACILE COIN program, Abt Associates Inc. has developed a logical design for a model of the terror phase of counterinsurgency activities. This model has been designed to simulate a system having the same basic elements and interactions as the manual game previously discussed. Each day of the manual game (i.e., every move) consists of a complete cycle of the simulation; one half of the cycle (night is devoted to insurgent activities and the other half (day) is devoted to government activities. This time relationship is shown graphically in Figure 8.3.1a.

Figure 8.3.1a

--EACH CYCLE CONSISTS OF--



After which certain control functions are performed and a new cycle starts (unless one of the belligerents has "won" the game--in which case the game ends).

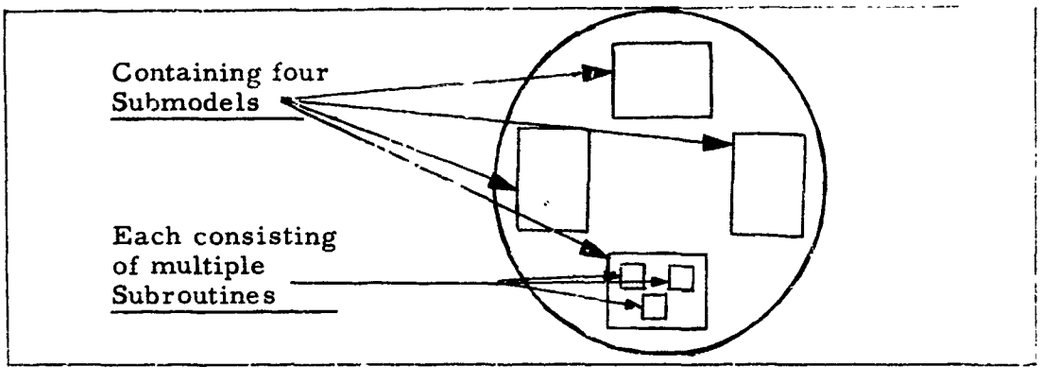
The model simulating the manual game has four basic elements, each of which is considered, in simulation terminology, a submodel. The four submodels are:

CONTROL
INFORMATION
BELLIGERENTS
VILLAGES

Each submodel is further subdivided into two or more subroutines, shown graphically in Figure 8.3.1b

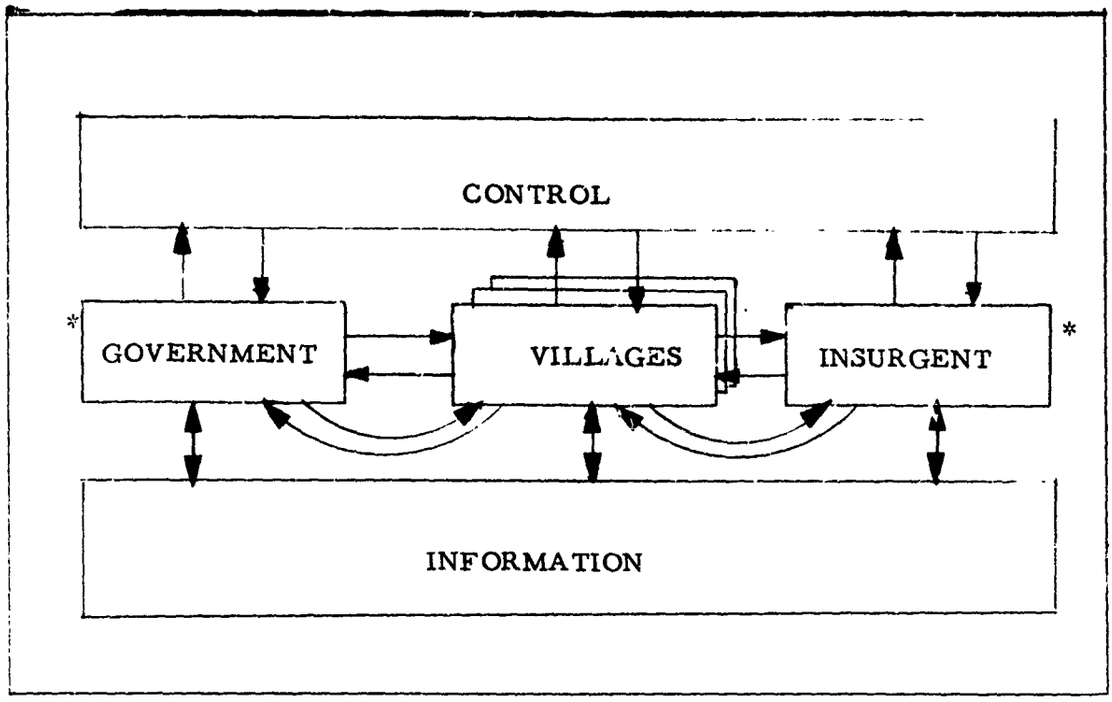
Figure 8.3.1b

AGILE-COIN SIMULATION MODEL



Each submodel interacts with the others through the various subroutines. This is shown graphically in Figure 8.3.1c. In this figure the BELLIGERENTS submodel is shown in terms of its two constituent elements, GOVERNMENT and INSURGENT. The arrows connecting each of the elements shown in Figure 8.3.1c represent interactions which may occur. The functions and interactions of each submodel and the subroutines of which each is comprised, are described in detail in the following sections.

Figure 8.3.1c



* Government and Insurgent activities, although shown separately here, are actually different aspects of the one submodel (BELLIGERENTS).

The following sections describe the four submodels and their subroutines. Detailed flow charts for these subroutines are provided in APPENDIX C.

8.3.2 CONTROL Submodel

As its name signifies, this submodel performs the major control functions of the system simulation. There are two such functions, each handled by a separate subroutine. One operates at any time during a simulation cycle; the other operates only at the end of each cycle.

FIGHT -- The simulation permits military engagements between belligerents, operating under ambush and counter-ambush conditions; and between belligerents and villages under face-to-face combat conditions.

This subroutine calculates all losses associated with an engagement. Using the four descriptors of every battle:

--Number of men in ambush

--Number of men in entering force

--Number of villagers

--Does entering force intend to spring an ambush

this routine calculates the effective force of each opponent which then determines the victor. (Provision for weapon types and unit effectiveness may readily be added later.)

Using the ratio of the effective forces, the duration of the engagement is determined. The duration, together with the effective force levels, determines the losses of both victor and loser, and the village crossfire (collateral) losses. These losses are then deducted from the force levels of the belligerents and the village involved.

REVIEW -- This subroutine operates at the end of each cycle and performs two functions. The first function is performed, regardless of the operating mode. The second function is performed in all but the player mode of operation. As its first function, it records the significant events of the cycle to be used for later review and analysis. As its second function, it maintains a three-move history, to allow for receipt of delayed information, which gives the action employed by each belligerent in each village, the significant descriptors of the village as perceived by each belligerent, and the effects of these actions on village loyalty. This information is then used to update the table of relative effectiveness for alternate actions as a function of the perceived village descriptors. This table provides a summary of loyalty shifts as a function of perceived village descriptors and the action employed. The loyalty shifts associated with each action are averaged and summed over all village descriptors. This information is then used to reinforce the desirability of those actions which appear to have a favorable effect on village loyalty. This information is, in turn, used in making future decisions.

8.3.3 INFORMATION Submodel

Information on actions, loyalties, force sizes, etc., permeates the entire model. Both belligerents and villages have access to varying amounts of information. However, none of them discerns the true picture because each looks at things from his own biased viewpoint, rather than from a common unbiased position. As a result, the belligerents and the village groups perceive the same basic information in whatever fashion that appeals most to them.

There are three basic information transfers:

Village ⟶ Village
Village ⟶ Belligerent
Belligerent ⟶ Village

Information is in two forms--transmission and reception--handled by the following subroutines:

1. TRANSMISSION

RIPPLE -- This subroutine provides for the transfer of information outward from village to village in a manner analogous to the spreading of ripples in a pool of water.

Information which may be transferred is the action taken by a belligerent in his visit to the village. The village provides this information to its contiguous villages after distorting the information so that it appears more favorable (or less injurious) to the belligerent whom the village favors.

As the ripple of information travels outward to non-contiguous villages, the amount of information reaching these villages is diminished as a function of the distance from the source of the information.

DIRECT COMMO -- This subroutine provides for two types of information transfer.

First, a village can query each of its adjacent villages to obtain a specific set of information. This set, of course, is biased to favor one of the belligerents unless the village is neutral.

Second, a village may communicate directly with a belligerent, giving warnings, making requests, providing requested information, etc. This is discussed in the BELLIGERENT and VILLAGE SUBMODELS.

PROPAGANDA -- Belligerents may communicate both information and visit purpose. The latter is directed to a village at the time that the visit occurs and is discussed in the BELLIGERENT'S submodel. The former is transferred through the PROPAGANDA subroutine. The essence of such belligerent-to-village communication is exaggeration. Each belligerent transmits information biased in his favor. The amount of the bias is determined by the PROPAGANDA subroutine.

2. RECEPTION

PERCEPTION -- This subroutine provides a filter through which transmitted information is received. The recipient tends to interpret the information (which may be biased to begin with) in whatever fashion most closely corresponds to his own point of view.

The new value of a perceived piece of information will be between its previously perceived value and the transmitted value. The amount of the change is determined by the loyalty relationship between the source and the receiver, the degree of correspondence between the information transmitted and the recipient's preconceptions; and, the reliability of the source's previous transmissions.

The information perception routine provides a filter through which transmitted information is received by the perceiver. The action perception routine determines the effect on the perceiving villages of the action implicit in the transmitted information.

The change in loyalty of the perceiver depends on the nearness of the action to the location of the perceiver, the psychological typology of the perceiver village, the action involved, the actor, and the size of the action, and the relationship of the perceiver to the village where the action took place.

ADMIN COMMO -- There is one exception to the general rule of distortion in the receipt of transmitted information. When the government has an administrator present in a village, the administrator has access to a select set of information which is transmitted to, and perceived by the government with no distortion. This occurs in the following fashion: at the

beginning of the move cycle, the information which the administrator has access to is placed in a pool. If no administrator is present, no information is placed in the pool. If an administrator is killed during a move, the information in his pool is destroyed. At the end of the cycle, all information in the pools is transmitted to the government.

8.3.4 BELLIGERENTS Submodel

This submodel is a generalized logical structure which permits interactions between the belligerents and the villages. The rationale for treating both belligerents--government and insurgent--within the same submodel deserves some justification.

Both belligerents have the same goal--winning--but their criteria for winning are different. Furthermore, each belligerent may employ a different policy in pursuit of his goal. He may also modify his policy depending upon its perceived relative effectiveness. Each policy, in turn, broadly defines the relative desirability of employing alternative actions (the means) to achieve his goal. This combination of different win criteria, policies, and preferences for alternative actions for each belligerent, permits one logical structure to be employed with no fear that the government and the insurgents will always reach the same conclusions from the same set of facts.

This submodel consists of the three subroutines described below.

MOVE PLAN -- This subroutine prepares the list of villages to be visited during the move, together with the number of men assigned to visit each village and the purpose(s) of each visit. (When there are multiple purposes for visiting a village, these purposes are ordered according to their importance in decreasing order.)

The contents of this list (village, purpose, visiting force) are determined by what the belligerent perceives that he needs to achieve victory--shifts in loyalty and/or relative force levels. The belligerent then selects those actions and villages which tend to satisfy the perceived needs. To induce selection of the most effective actions to satisfy these needs, the relative desirability of employing the alternative actions is modified based on information provided by the REVIEW subroutine.

BELLIGERENT ACTION I -- Using the village visitation list, provided by the MOVE PLAN, this subroutine reacts to the village warning decision. It uses all available information on the village, coupled with the belligerent's policy to decide upon which action to take with respect to the village. Three alternative actions are allowed: GO AWAY, PROBE, ENTER IN FORCE.

BELLIGERENT ACTION II -- Given the action to be taken (from BELLIGERENT ACTION I, above), this routine either skips to the next village (GO AWAY) or enters the village with a PROBE or IN FORCE. Having entered the village, the belligerent either is forced out of the village, or communicates the purpose of the visit to the villagers. This purpose may be either the originally intended one (from the visitation list) or a new purpose resulting from a change in the belligerent's perception of the village. This visit purpose is then used to initiate a village action.

8.3.5 VILLAGES Submodel

This submodel couples with the BELLIGERENTS Submodel to provide interactions between the villages and the belligerents. Each village responds to the belligerent actions based on the information available to it. Its response is such as to further its own best interests, based on the situation which it perceives.

This submodel consists of the six subroutines discussed below.

ELECTION -- The population of each village may be subdivided into three (or more) groups of varying sizes, nominally referred to as left-, center-, and right-oriented. The differences between the village groups are due to different attitudes, personality types and action styles, which result in different propensities to take different actions. These groups elect a village chief to represent the village in all dealings with belligerents. The chief is chosen from that group which appears least different and most powerful. As the game progresses, differences are modified, and power shifts occur. This develops dissident groups which force another election.

COHESIVENESS -- This subroutine compares the perceived information, propensities to take alternative actions, and loyalties of the chief's group with those of the other two groups. As the differences between the chiefs group and the other groups grow, dissident elements emerge. They force new elections and if they are not satisfied with the results, they can leave the village and either join one of the belligerents or attempt to join another village.

WARNING -- This subroutine determines whether a belligerent is given a warning of ambush when he approaches a village. Each village makes its own decision as it is approached. This decision is based on village loyalty, the chief's propensities to take alternative actions, which belligerent appears to be winning, and the perceived size of the approaching force. The decision is a two-step procedure. First there is a decision to lie or to tell the truth; then to provide no warning, a general warning, or a specific warning (giving the number of men in the ambush force).

ACTION -- This routine provides a village response when a belligerent enters a village and announces the purpose(s) of his visit. Depending on the purpose(s), the village may take a variety of actions. In the situation where a belligerent enters a village for the purpose of springing an ambush, there is no village response, except through the WARNING subroutine, and the FIGHT subroutine which determines village crossfire losses if there is an actual engagement.

The belligerent may wish to know the village's perception of some specific information to which the village has access. In this case, the village has the option of lying or telling the truth in answering the request for information.

The belligerent may wish to recruit, impress, reprise, leave an administrator, leave an ambush, remove an ambush, or return men. The village may accept, object to, or resist the belligerent's planned action. If he accepts, the action is carried out; if he argues, the belligerent re-evaluates his purpose which the village must then accept or resist; if he resists, the result of the visit is determined by the RESIST subroutine.

Finally the ACTION subroutine also considers village-initiated actions. It allows a village to kill its administrator (if it has one); volunteer its men; and make requests for the next move (return men, and visit/do not visit).

The actions which it chooses depend upon the propensities of the village chief.

RESIST -- When a village decides to resist a belligerent's request, there is a military engagement, whose outcome is determined by the FIGHT subroutine. If the village is the victor, the belligerent must withdraw; if the belligerent wins, he is allowed to re-evaluate his purpose which must then be accepted by the village.

LOYALTY -- In each cycle each village re-evaluates its loyalty based on belligerent actions within that village during the cycle, its perception of the information currently available to it, and its past loyalty. This re-evaluation is made by each of the village groups.

8.4 The Technical Feasibility of the AGILE-COIN SIMULATION

An objective of this study was to evaluate the feasibility of building a mathematical model of the terror phase of IRC starting with a manual game.

Research Objectives

1. To evaluate the potential gain derived by starting model building with a game, when the particular theory is poorly understood or incomplete. One gain which was not anticipated was that the game would turn out to be a product which could be used as a training device by itself. An important benefit resulting from this modelling process was the short time in which the important variables were identified and the true situation dynamics were modelled. Additionally, refinement of the manual game took about ten formal play-throughs to establish proper settings of parameters and game dynamics. The evaluation of the gain in time for building the simulation is reported below.

2. To determine and quantify the major variables:

The game proved to be an efficient device for variable identification. Control scorekeeping required both variable displays and some variable measurement. For example, loyalty was reported and used to help determine game outcome. Quantification proved somewhat more difficult until the simulation design effort was started. Requirements for setting situation variables forced quantifications and corresponding relative utility scale identification.

3. To determine and formulate a decision array that can "learn" from external stimuli:

We experienced some difficulty in understanding and using the decision array because the decision weights are functions of the situation variables and, therefore, difficult to hand-calculate. We wanted to make the simulation like the manual game so that as the game progressed, the model would be self-adapting, much as the human player. The decision models for each actor were constructed in the form of 2-dimensional arrays with possible actions along one axis and the variables representing the situation along the other. Each total situation was represented in the simulation by settings of the component situation variables. The decision array selected the action having the highest apparent effectiveness, based on previous experience. When this action proved successful, the decision weights selecting it were reinforced while the other possible action selection weights were inhibited slightly. The machine actor personality defined the amount of reinforcement--rigid personalities learning more slowly and flexible personalities more rapidly. At the end of each game the decision array is restored and the variance in weights is pointed out. Permanent changes to the decision array weights can only be made by an analyst.

In addition to this action decision array, the model contains a policy decision array which emphasizes certain sets of actions over others and some decision logic. Decision logic differs from a decision array in being programmed, i.e., certain situations always result in certain determined actions. Decision logic simplifies model construction and understanding at the expense of adaptibility and flexibility.

Game Quantification

By quantifying the game we mean translating game dynamics and actions into a mathematical and logical model. Direct actions such as impressment, ambush, etc., were incorporated into the simulation design exactly as played in the game, while actions such as propaganda, threat, anger, and terror had first to be converted to relative utility variables. For example, the effect of propaganda on a village was measured using the village's receptivity, credulousness, etc. Threat was treated as part of risk taking and tends to dampen village independence. In general, all the major recognizable actions and responses have been included in the model. The actors have been simulated by parameterized personalities; i.e., while keeping three types of actors--the two belligerents and the village--each actor is imbued with variable and externally controllable characteristics. Each village faction can be made to look different (or the same) providing varying degrees of village cohesion. The belligerent personality can be set according to its decision-making policy traits--hard, responsive, negative, etc. The selection of starting or initial parameters for the model then determines to some extent the kinds of responses that can occur.

The rules have been quantified in the model by providing or omitting logical design paths. For instance, in simulating the rule involving single usage of visiting men by each belligerent in each move, a schedule is drawn at the start of each move for the visiting force sizes. Violation of this schedule after the move starts is prohibited because no logic is provided for a re-evaluation after each visit of the size of the visiting force available for the next village. In effect then, all villages are assumed to be visited simultaneously by separate field forces. Table 8.4A lists other changes or built-in logic that make the simulation somewhat different from the game.

The model as it is currently structured is an extended replica of the game being tested in the military service schools.

TABLE 8.4A

Differences Between the Simulation and the ARPA-COIN Game

Topic	Simulation	ARPA COIN Game	Comments
Information	On the spot information given to belligerents about another village cannot be acted on during that visit.	Any information received at any time can be used by a belligerent at any time.	In the simulation, information received after insurgent move, but before government move or vice-versa, can and will be acted on in making up the unit list.
Village Faction	A village faction is only active after it has actually been classified dissident. In a semi-cohesive village, warnings are given only by the village chiefs. Up to two different dissident factions can be present in any village.	The village faction is role-played and has no arbitrary rules associated with it.	
Village Arguments	Effects of village arguments on a belligerent depend on: belligerent perception of village image, perception of other belligerent strength, and desire to protect the village.	The effect of propaganda is role-played and can have any effect.	
Probe	A probe can be sent into a village, and, if not returned, a force "waiting in the outskirts" can be immediately sent in. (This force must be actually present--not transferable from a force visiting another village.)	No comparable structure exists in the game for the probe to return.	
Volunteers	Village decisions to volunteer men or to kill administrators are not worked out. (No clever trick devised.)	Volunteering men is at the discretion of the player.	

TABLE 8.4A (continued)

Topic	Simulation	ARPA COIN Game	Comments
Policy Changes (personalities)	Policy changes during play are a function of village and/or belligerent personality such that "flexible" persons learn from past mistakes faster than inflexible or rigid personalities. The personality is present as an initial game parameter.	Policy changes are role-played.	
Personalities	Belligerent does not differentiate between men belonging to different factions or to their chief--e.g., the chiefs cannot be killed, impressed, or removed--or, in a sense, they are always immediately replaced if killed.	Belligerents can identify "personalities" as players.	
Faction	A village faction can leave the village. The game treats it as an emigrè volunteering its services, and it leaves the game as a viable entity.	The player can leave as a faction, but he never is eliminated from the game.	
Fatigue	Player fatigue is not simulated, however, loyalty weights decay when the village receives no visits.	Players sometimes make "strange" plays to end the game when tired.	We think the simulation is more realistic in effect.
Visits	A belligerent can visit all villages on his list each cycle--some cycles are longer or shorter. We simulate simultaneity of visit as well as sequence.	A belligerent may not visit all villages because of either time pressure or force commitment.	The visitation list precludes excessive unrealistic force commitments.
TERROR	Terror is defined as a complete freeze of a village--no reactions, no loyalty shifts etc. Terror is unfrozen after a period of time.	No comparable game activity except village feeling of pressure which may or may not result in inaction be the villager.	Terror was experienced when a village was nearly or completely wiped out.

Limitations of the Manual Game

A by-product of this study has been a determination of the point at which diminishing returns came from using a game as a model and the point at which the mathematical model should be stated. This point was determined for the AGILE COIN Game at about ten formal play-throughs. The break-even point is reached when the manpower cost for manual play exceeds the gain in learning or modification that results. Beyond this point manpower can be better spent quantifying the game into mathematical form. A second design trade-off occurs when the desired output of the game play takes the form of multiple game analysis. At this point, better use of multiple play can be made from the simulation than from further manual play alone. The final manual game limitation is reached when many different tactics, policies, or strategies are desired as hypotheses to be tested. The manual game cost in time and men begins to exceed the cost for conversion to the man-machine simulation form.

Evaluation of the Simulation Method

The method of simulation development beginning with a game, translating to a mathematical model and thence to a man-machine simulation, offers several bonuses beyond the obvious pay-off of a game useful in its own right for training. For example, the game described the man-to-man interactions and information needs in sufficient detail for the simulation displays to be constructed. The game also provided the decision arrays in a form easily transferred to the simulation. The difficult task of quantizing the emotional variables was made easier by the game, because the relative and situation-bounds significance and relevance of anger, threat, propaganda, etc., have been demonstrated through game plays. Information has been broken down into its component variables--perceived, directed, delayed information, etc., and it is these variables which are used to transfer threats, propagandas, etc.

The manual game defined precisely the multiple possible paths of the actor decisions. The action array has been included, partly in logical (if...then) sequences, and partly in action selection array form. The settings of the decision weights were made by judgment based on manual play-throughs of the mathematical model, and by comparing the human player decisions and selection of significant elements, with those actions selected by the decision array. This method allowed preliminary tuning of the weights.

Game Analysis

Section 6 listed some specific hypotheses drawn from game play to be tested using the AGILE-COIN simulation model in computer simulation form. Some of the hypotheses could also be tested by use of the AGILE COIN Game but with players selected from specific South East Asian countries. For example, one of the questions relates to the differences in action response noted by experts with field experience versus other United States players.

Summary

The method of building a man-machine simulation of a phase of internal revolutionary conflict starting with a manual game has been shown to be technically feasible. Quantitication of significant variables has been made easier because of the clarity of variable interaction brought out by the game.

An unexpected pay-off was derived when the game was itself useful as a product for training.

Extending the simulation to actual use on a time-shared computer system should allow the simulation to learn from experts, to provide relative indications of preferable belligerent actions, expected village responses, better counters to enemy tactics, and should identify the kinds of data which should be collected in the field.

APPENDIX A
THE MANUAL GAME

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APPENDIX A

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APPENDIX A

THE MANUAL GAME

This appendix provides a historical summary of the manual play experience with the ARPA AGILE COIN Game. It includes a brief summary of actor strategies and the outcomes of game play for T-2--T-15 (Sect. 1.0). An evaluation of types of communication employed in the course of game development and its present refinement is present (in 2.0). Game stimulated comment has resulted in significant insights into the insurgency situation and actor perceptions of it which are listed (in 3.0). Finally, the complete game analytic records are displayed.

GAME POLICY SUMMARY

The following section attempts to summarize the policies employed by all participants in the manual plays (T-2--T-15) of the AGILE-COIN Game. This body of history has been compiled from interviews with players, critique comments, and inferences from game play and control records. Obviously, the problem of good data collection on policy is sufficiently serious to urge cuation in interpreting the results (See detail of T-15 analysis in Section 3 of the main report). The principal utility of this section stems from its suggestiveness. It exists as a record of what policies were tried and how they fared in a given situation. This section should not be construed as policy recommendations.

A general hypothesis on the relation of government and insurgent policies is included as a first step toward clarification, despite some lack of generality on its assumptions.

GAME NUMBER	GOVERNMENT STRATEGY	INSURGENT STRATEGY	VILLAGE STRATEGIES AND RESPONSES	OUTCOME	CRUCIAL FACTORS
T-2	Large Patrols. Protect on Request. Large Ambushes. Policy: Minimize Village Losses.	Indiscriminate Terror. Large Visits (Patrols). Large Ambushes. Over Favorable Perception of Village Loyalties.	Two Villages Had Coalition for Information, Protection (via Warnings) and Game Control Others Were: (a) Very Credulous (b) Impressed by Military Action (c) Enraged by Terror Campaign.	Government Win	Decisive Military Engagements. Information Control by Village Coalition.
T-3	Conservative. Small Ambushes. Preserve Status Quo. Favored Protection of Self vs Philanthropy.	Gain Popularity by Giving up Men, Impress Later. Gained Good Intelligence and Counterambush.	1.Play Both Sides off Against Each Other, Evaluate Promises and Results. 2.Leave me Alone Policy. 3.Others Entirely reactive, Greedy.	Stalemate	Insurgent Had the Loyalty But Not the Manpower. Village Greed for Men.
T-4	Early Random Ambush to Deny Insurgent Access no Penalty Policy for Lying. Reduced Ambush Size. Later Which led to Insurgent Spread.	Slow Development of Good Intelligence--Counter-Ambushes Policy--Punishment and Reward, Terror With Justice, Village by Village, Forces Concentrated. Return Losses due to Cross Fire.	1.Military Intelligence and Ambush Results Determined loyalty. Terror Perceived as Retribution. Villages used Intelligence to Bargain with Belligerents.	Insurgent Win	Decisive Military Victories Resulting Development of Village Loyalty and Good Intelligence.
T-5	Large Random Ambushes to Close Village Access to Insurgent--Hampered by First Move Rule. Small Ambushes Maintained in all Later. Much Deception and Intrigue Based on Win Criteria.	Initially Only Rational Persuasion Since Government Could Not Act until Insurgents Did. All Impressments Would Be Returned if Winner Used Good Intelligence to Circumvent Small Ambushes.	1.Bribe Government to Change Win Distribution of Dead. 2.Rationally Persuaded by Win Criteria--Gave Ins. Information. 3.Commitment of Loyalty Based on Competence. 4.Winning Obviates Loss of Men in Ambushes.	Draw (Actually an Insurgent Win Due to Villager Rule Misunderstanding)	Rational Calculation Overrides Threat of Cross Fire Losses.

GAME NUMBER	GOVERNMENT STRATEGY	INSURGENT STRATEGY	VILLAGE STRATEGIES AND RESPONSES	OUTCOME	CRUCIAL FACTORS
T-6	Large Random Ambush. Punish--Reward Policy. Reactive--No Planned Strategy.	Unpredictable Responses. Hostages for Loyalty Returns, Men for Information, Kill All Administrators.	1.Village Becomes Informant for Insurgent. 2.Much Inter-village Communication Leading to Bandwagon. 3.Felt Ambushes Implied Loyalty. 4.Volunteers in Response to Returns.	Insurgent Win	Trust Led to Intelligence.
T-7	Inaction and Impressment. Small Ambushes. Early Impressment Led to Village Commitment (Later Resented).	Repeated Terror Leads to Believable Threats Which Gain Information. All Impressment in Pro-Government Village Buys Further Information From Committed Villages.	1.Ambush Results Determined Loyalty. 2.Terror Swayed All. 3.Government Protection Unavailable and Administrators not Present. 4.Trade Loyalty for Non-involvement.	Insurgent Win	Terror
T-8	Equal Impressment in All Show of Force. Keep Presence in Village.	Take Advantage Government Inaction. Impress with Threats.	1.Force Presence Overawed Village. 2.Threat Determined Loyalty. 3.Commitment of Men Forced Loyalty. 4.Protection Granted→ Loyalty. 5.Rationale of Persuasion from Rules.	Control Stopped = Draw	Threat
T-9	Give Feedback. Respond to Protection Requests. Impress With No Return.	Victory Bandwagon. Early Threats. Return Some Men. Strategy Teamwork. Loyalty Most Important.	1.Propaganda From Number Recruited. 2.Ambush Results→ Volunteers. 3.Lack of Returns.	Insurgent Win	Village Coalition

GAME NUMBER	GOVERNMENT STRATEGY	INSURGENT STRATEGY	VILLAGE STRATEGIES AND RESPONSES	OUTCOME	CRUCIAL FACTORS
T-10	Punishment by Impressment. Long Range Concern for Loyalty.	Reactive Strategy. Take Advantage of Impressment Resentment.	1. Avoid Commitment, But Pick Winner. 2. Impressment Very Unfavorable. 3. Rules Show that Village Coalition Should Favor Insurgents.	Insurgents Win	Government Punishment Backfired. Village Coalition.
T-11	Deploy Ambush to Scout Out Insurgent (→Distrust). Random Ambushes. Later Try Draw Out Insurgent.	Impress to Maximum. Visit Overwhelming Force. "No Losses"--Propaganda. No Ambushes. Waiting Game (For Loyalty Shift).	1. Avoid Ambush, Offer Recruits. 2. All Wait for Winner in Neutral Loyalty.	Stalemate	Lack of Village Feeling of War.
T-12	Treat all Alike. Weaken Insurgents with Ambush Until Access Denied. Parade Strength.	Rewrite Rules. Emphasize Cross Fire Losses to Gain Information. Large Counterambushes. Gain Loyalty by Return of Conscripts.	1. Use False Ambush Warnings to Draw in Insurgents. 2. Insurgent Weakness Perceived in Returns.	Government	Crucial Ambush at High Risk.
T-13	FLOWCHART GAME--NOT RELEVANT				
T-14	Political Appeal Be Good=No Admin. No Impressment Punish When Lost Loyalty.	Impress Maximum Early Before Government--Cultivate Loyal Village for Intelligence. Cut Off Government Information by Killing Administrators.	1. Play Double Game. 2. Keep Belligerent out of Village. 3. Observed Ambush Results. 4. Threats to Shift Loyalty to Test Belligerent Confidence. 5. Need Reasons to Change Loyalty from Government: None.	Stalemate	Insurgent--Military Victor Through Intelligence. Government--All Loyalty from Administrator and Impressment Policy.

TERROR GAME STRATEGY ANALYSIS AND HYPOTHESIS

This analysis is based on the assumption that, in the long run (for any given game), strategy is based on the action of the government. Due to the communications and manpower differentials, the government has overwhelming strength, and the insurgents must adapt to the policies of the government, and not the other way around.

What are possible strategies? From observation of the manual games could strategies be divided into three groups, differing in "dynamism", "terror quotient", and measurably, manpower committed.

Strategy		Manpower/village committed
3	Military or terror game	Whole or significant fraction of total
2	Political game	Few men/ village
1	Waiting game	zero men/ village

Broken down into government and insurgent strategies, the pattern is as shown on the following page.

Strategy	Government Version	Insurgent Version
3 Military	Large ambushes at as many villages as possible; retribution "swift and terrible"; aggressive propaganda campaign, may actively recruit	Practive of terror; aggressive propaganda; large (full-force) mobile ambush, preceded by one-man reconnaissances; extortion of intelligence; hostage-taking, stern reprisals practiced; active recruitment
2 Political	Stress on communication; hand-outs frequent (of propaganda material); frequent polling of village needs; image build-up of confident strong government	One-man probes for information and speech-making frequent; polling of village needs; intensive statement of desire to end game soon; great expression of confidence; tolerent rational attitude displayed
1 Waiting	Non-involvement passive and reactive only	Non-involvement; occasional propaganda hand-outs; villages urged to act rationally

As has been noted in past-game conversations, timing of actions and strategies is extremely important. It is postulated, however, that certain patterns would dominate statistically in a series of games (or simulations).

I. The Government should be able to gain, at worst, a draw using strategy 3. Unless insurgent intelligence is unusually good and insurgent strength is high and government ambush size too small, this rule should hold. A draw results if government strength is insufficient to hold 80% of villages at one time, or no randomization of ambushes is used, or insurgents gather strength in first move by impressment and go to strategy 1. Government should win otherwise (Example; June 3).

Corollary: If insurgents use #1; and government uses #3 immediately after insurgents impressment, game cannot help but be a draw.

II. Ideal Insurgent strategy = MOD (Government Strategy, 3) + 1

I. e.,

Government Strategy	Ideal Insurgent Strategy	Example
3	1	T - 11 (Pike vs Frey)
2	3	IDA Student (Miller vs Gude)
1	2	IDA-Friday (Blumstein vs D'man) (latter part)

This assumes that the insurgents recruit on first move as the only logical move on 1; at any rate insurgent recruitment before government ambush. Each of the second two entries involves being more aggressive than the government; the first entry involves withdrawal from conflict due to negligible chance of being more aggressive than government.

III. Ideal Government strategy number $\geq$ Insurgent strategy number (e.g., escalation). This holds even when insurgents use strategy 1--2 or 3 for government will gain draw. Conclusions II and III suggest some sort of Lanchester-type relation in which:

$$S_g^{\,a} * A_g^{\,b} = S_i^{\,a} * A_i^{\,b}$$

where $b > a$ or perhaps $b >> a$.

S_g = Government force strength
S_i = Insurgent force strength
A_g = Government aggressiveness
A_i = Insurgent aggressiveness

We see that given $A_i = A_g$, $S_g > S_i$ results in government victory; however, given $S_g > S_i$ and also $\frac{S_g}{S_i} = \frac{A_i}{A_g}$, insurgent victory is likely. Communication would probably fit into the equation but likely A & S dominate.

IV. Given a rational opponent, government must appear to be using a strategy other than 3. The government can win only by luring the insurgents out of strategy 1. The insurgents will abandon strategy 1 only if the government is perceived as being in states 1 or 2. If government can lure the insurgents into 2 or 3, it can adopt strategy 3 and win--if the insurgents are in 3, or keep up 2 long enough.

Corollary: To keep the insurgents from switching back into 1 and remaining there like a turtle in its shell, the government may have to stay out of 3 almost entirely. Since I3 dominates G2, and G3 dominates I3, an impression of 2 by the government should lead to adoption of I3. A suitably timed switch in G3 should end the game.

General Conclusions:

Given two rational players and either perfect intelligence or no intelligence, a game theory matrix (minimax, etc.) analysis of strategies should be useful.

References

1. The Compleat Strategyst, J. D. Williams (RAND) McGraw-Hill 1954.
2. Executive Decisions & Operations Research, D. W. Miller & M. K. Starr, Prentice-Hall, 1960.
3. Economic Theory & Operations Analysis, W. J. Baumol, Prentice-Hall, 1961.

Inter-Actor Communications

Various techniques of communications simulation were tested, including village proximity (direct communications) telephones between separate rooms, and a "courier" or messenger who delivered written notes to the various teams.

The most realistic communications system involved use of the courier because information was less easy to obtain and there was more uncertainty on the part of the villagers as to the state of the entire conflict. An interesting development of this uncertainty and poor communications was the tendency for villagers to overestimate the belligerents' strength.

In post-game comments, almost all players agreed that game communications with the courier were realistically inadequate; however, two players mentioned that both signal and noise levels seemed excessively high, that the potential for direct communication, precise strategy planning based on information received, and introduction of false or misleading information was exaggerated. Most villagers did not act with an appreciation of the probability of message attrition built into the courier system.

Significant Critique Statements

Following are selected comments and evaluations from the post-game player critique forms:

THE MOST REALISTIC ASPECT OF THE GAME:

"The inability of the Government to act repressively without risking political loss."

"Multiple self-interests, instead of a 2-sided conflict."

"Inability to perceive decisive course of action." (Villager)

"The outcome was realistic in that it showed that in the early stages of such a war the government usually tries too hard to do too many things and in essence doesn't think of long-range strategies. (Villager)

THE MOST UNREALISTIC ASPECT OF THE GAME:

"No initial village grievances."

"Control's method of transferring men, presented secrecy." (Government)

"Villagers wheeling and dealing."

"The most unrealistic thing about the game was the difference between those who had played before and those who had not."

"There was no way in which the government could track down the insurgents and go after their supply depots, their base camps, etc. In short there was no point in government trying to get information from the villagers as to where the power base of the guerrillas was." (Government)

NEW PROBLEMS THAT PLAYER HAD PREVIOUSLY NOT BEEN AWARE OF:

"Mutual misperception and distrust among villagers."

"Both belligerents underestimate their own position and overestimate the opponent's strength." (Government)

"(My) loyalty tied to belligerent holding my men as hostages." (Villager)

"The most important thing learned was that the use of betrayal without fear of being overheard (by the use of notes) lessens inhibitions of villagers to the point that ambushes become almost sure things." (Villager)

MOST EFFECTIVE STRATEGY FOR THE GOVERNMENT:

"Abstain from impressment." (Insurgent)

"Leave villages alone, impose presence when requested." (Government)

"Not impressing men." (Government)

WORST GOVERNMENT MISTAKE:

"No random ambushes." (Insurgents)

"Overimpressment." (Villager)

"Overimpressment (Insurgents made none)" (Insurgent)

"The government's mistake was that it never forced me to tie down any men in ambushes and left me with a full force to wipe out his ambushes."

MOST EFFECTIVE STRATEGY FOR THE INSURGENTS:

"Kill administrator, deny intelligence." (Insurgent)

"Urge neutrality, then a switch to winner." (Insurgent)

"Anonymous assassination, followed by agitprop." (Villager)

"More varied approach village by village."

WORST INSURGENT MISTAKE:

"Impatience, leading to risky ambush attempts." (Insurgent)

"Sending in an ambush with bad information." (Insurgent)

MOST EFFECTIVE VILLAGE STRATEGY:

"Play one side against the other at the outset." (Villager)

"Be neutral and uncooperative." (Villager)

"If forced to cooperate by either side our strategy was first to try to give men than to have an mabush left, because of the crossfire losses that usually followed."

WORST VILLAGE MISTAKE:

"Allowing ambushes into village." (Villager)

"The loser in these games must be the person who, when punished by one side, immediately becomes his friend and betrays the other side only to be punished by the other side next move." (Villager)

Game Records

The following section presents summaries and analyses of the last eight games.

Summary, Game 7, 5 May 1965

The major results of the games of 5 & 6 May 1965 played at IDA with students as villagers, Ted Gude as Government, and Pete Miller as Insurgent, were changes in the rules and experience with the IDA facility.

The 5 May game started rather slowly with small impressments by the Government and cautious probes by the Insurgent. Village loyalties were primarily neutral and pro-government. On cycle 3 (of 12 total in the game), a 17 man Government ambush was wiped out by the Insurgents. They then left a 20 man ambush of their own which was subsequently eliminated by the Government (cycle 4). This was the low point of the game for the Insurgent because of his initially small population. At this point the Insurgent enlisted 20 men from village F and gained his loyalty (from neutral to insurgent). The reason stated for the loyalty shift was "failure of the Government to provide protection; loss of administrator". This loyalty was maintained for the remainder of the game. The Insurgent then went to village C (which remained pro-government throughout the game), overcame an 18 man Government ambush, and impressed 30 men. The Government responded by building up an ambush of 53 men in village C which resulted in the subsequent loss of only 2 Insurgents. The Government then left ambushes of 12 and 25 on cycles 9 and 10 which were overcome by the Insurgent due to accurate intelligence.

With an adequate increase in his forces, the Insurgent concentrated on threats to achieve the necessary loyalty shifts. Village D shifted in his favor on cycle 10 with the following reason: "Insurgent has not killed or impressed men so far, but is starting to put on pressure--have not seen Government for 3 rounds." At this point the Insurgent had the necessary 3 village loyalties (A, G, and D), but he had to hold them for 3 successive cycles. He then stormed into village B (that had switched from Government to neutral on cycle 9) with a large force and demanded his loyalty under the threat of killing 40 men. B responded accordingly with the stated reason: "threatened to kill 40 men." The retention of the loyalties of A, G, D, and B was sufficient to win the game for the Insurgent 2 cycles later.

T-7:

VILLAGE A

Move #	1	2	3	4	5	6	7	8	9	10	11	12
Visit I			X	X	X							
Visit G			X	X	X	X						
Loyalty		G	G	G	G	I	I	I	I	I	I	I
Population		100	90	74	74	73	70	70	70	70	76	76
Administration	A	A	A	A	A	-	-	-	-	A	-	-
Impress I			10	10								
Impress B			G									
Ambush I				20								
Ambush G			17		20				25			
(Winner) Outcome				I	G	I				I		

SUMMARY:

Visits: 3 (Ins.); 4 (Gov.)
Government loyalty turning to Insurgent loyalty
3 Government ambushes counterambushed
1 Insurgent ambush counterambushed

VILLAGE B

Move #	1	2	3	4	5	6	7	8	9	10	11	12
Visit I	(no info)											
Visit G												
Loyalty	N	N	N	N	N	N	N	N	G	G	I	I
Population	100	100	100	100	100	100	100	100	96	96	-	-
Administration	A	A	A	A	-	-	A	A	-	-	-	-
Impress I												
Impress B												40
Ambush I												
Ambush G												
Outcome												

SUMMARY:

Very little action in this village. Neutral then Government then Insurgent loyalty

T-7:

VILLAGE C

Move #	1	2	3	4	5	6	7	8	9	10	11	12
Visit I							X	X				
Visit G			X	X			X	X		X		
Loyalty	N	G	G	G	G	G	G	G	G	G	G	G
Population	100	98	88	86	86	86	52	47	43	34	33	-
Administration	A	A	A	A	A	A	A	A	A	A	A	
Impress I							30					
Impress G	2		10							10		
Ambush I												
Ambush G			17				41	53				
(Winner) Outcome							I	G				

SUMMARY:

Visits: 3 (Ins.); 5 (Gov.)
Early neutrality, turning to pro-government.
3 Government ambushes, one victorious, 1 counterambushed

VILLAGE D

Move #	1	2	3	4	5	6	7	8	9	10	11	12
Visit I						X		X	X	X		
Visit G		X				X	X					
Loyalty	N	N	N	N	N	N	N	N	N	I	I	I
Population	100	95	95	95	95	95	95	95	95	100	100	100
Administration			A	A	A						A	A
Impress I												
Impress G		5										
Ambush												
Outcome												

SUMMARY:

Visits: 4(Ins.); 3 (Gov.)
Neutral, turning to Insurgent loyalty
Final population: 100, winning village
Turned Insurgent because of Insurgent demands, after not impressing or killing to this point. Government not seen for 5 rounds.

T-7:

VILLAGE E

Move #	1	2	3	4	5	6	7	8	9	10	11	12
Visit I	X		X									
Visit G					X		X			X		
Loyalty	I	N	G	G	G	G	G	G	G	G	G	G
Population	100	100	100	100	86	85	77	76	77	77	77	77
Administration		A	A	A	A	A	A	A	A	A	A	A
Impress I												
Impress G					14		8					25
Ambush I												
Ambush G												
Outcome												

SUMMARY:

Visits: only 2 by Insurgents, at least 3 by Government

Village turned pro-government because of lack of Insurgent visits

High Government impressment: 47, did not change loyalty

VILLAGE F

Move #	1	2	3	4	5	6	7	8	9	10	11	12
Visit I	-	-	-	-	X	-	-	X	-	-	-	X
Visit G	-	X	-	-	-	X	X	-	X	-	-	X
Loyalty	I	N	N	N	I	I	I	I	I	I	I	I
Population	100	98	98	98	77	78	78	2	51	51	51	51
Administration	-	-	-	A	-	A	A	-	A	-	-	A
Impress I					20							
Impress G		2							20			2
Ambush I						17			17			
Ambush G												
(Winner) Outcome						I					I	

SUMMARY:

Visits: 3 (Ins.); 5 (Gov.)

Largely Insurgent loyalty, result of Government inability to provide protection, loyalty reinforced by Insurgent victories

Heavy impressments by both belligerents

Summary, Game 8, 6 May 1965, IDA Washington, D.C.

The 6 May game started more quickly and aggressively than the one on the previous night. The participants were the same except for 1 villager. The Government began by enlisting 10 men from each village for his forces. The only immediate effect of this action appeared in village A with a shift in loyalty from neutral to Government with the reason given: "Loss of 10 men to Government. Therefore must support Government". Village A maintained his government loyalty until cycle 6 when he switched to the Insurgent because he "Voted for Government for 4 rounds--didn't win--must be losing. V. C. threatened to wipe out my village."

The Insurgent increased his forces by impressments from villages F (20) and C (10). F's loyalty switched from neutral to insurgent because "Insurgent has incurred heavy losses on the manpower of my village and will take more if I don't give him my loyalty". However C's loyalty drifted from neutral to government because he "has more men and guaranteed protection."

The government then (cycles 4, 5, and 6) left ambushes in villages F, E, and B and achieved loyalty shifts in his favor in E and B. Stated reasons were: "The Government seems to have the upper hand", and "Presence of strong government force, threats of insurgents."

Village D loyalty shifts were apparently due to persuasion since no significant event occured there after the impressment of 10 by the government on cycle 1. Neutrality was maintained for 3 cycles, followed by shifts to government, then insurgent on 4 and 5 with the reasons being "Force" and "Will fight government."

On cycle 6 the game was stopped inadvertently by Control because of an apparent loss of the total Insurgent force due to an encounter with a 31 man government ambush and the desire of the villager to support the ambush with his own villagers. This would have been a proper ruling by Control if the Insurgent had not been expecting an ambush. He was, however, and due to a recent rule change the forces should have fought at 1:1 effectiveness. Had this occurred, the Insurgent would have won. If the situation had been presented more clearly to the villager, he would probably have made an opposite decision. Rule changes resulted.

When the game was called, the Insurgent had adequate forces and the loyalty of 3 villages for 1 cycle.

T-8:

VILLAGE A

Move #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Visit I	X			X	X	X	X	X	X	X	X	X	X		X		X
Visit G	X	X		X	X	X	X	X	X	X	X	X	X		X		X
Loyalty	G	G		G	G	G	G	G	G	G	G	I	I	I	I		I
Population																	
Administration	A	A					A	A			A		A	A	A		
Impress I					10							15					
Impress G																	
Outcome																	

SUMMARY:

Visits: 12 by each side.
Government action too late.

VILLAGE B

Move #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Visit I	X			X		X											
Visit G	X	X		X	X	X			X	X	X		X	X		X	
Loyalty	G	G		G	G	G	G	G	G		G		G	G	G	C	
Population																	
Administration																	
Impress																	
Outcome																	

SUMMARY:

11 Government visits, only 3 Insurgent.
Village solidly pro-government.

T-8:

VILLAGE C

Move #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Visit I	X			X		X			X				X				
Visit G	X	X		X		X		X	X			X	X	X	X	X	
Loyalty	N	N		N	N	G	G	G	G	G		G	G	G	N	N	
Population																	
Administration	A				A	A	A	A		A		A	A	A	A	A	
Impress																	
Ambush	G			30	30	30	30	30	0	30		30	51	0	40	0	
Outcome							G	I						G			

SUMMARY:

Visits: 5 (Ins.); 11 (Govmt.)
Neutral, government, neutral loyalty.
2 successful Government ambushes.
1 successful Insurgent counterambush.

VILLAGE D

Move #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Visit I			X			X				X			X		X		
Visit G	X	X	X				X	X	X				X	X	X		
Loyalty	N	N	G	G		G	G	G	N	I		G		G	G	G	
Population																	
Administration																	
Impress																	
Ambush			50	50		50	50	20	20	0		20		20	40	40	
Outcome																	

SUMMARY:

Visits: 5 (Ins.); 9 (Govmt.)
Vacillating loyalties.
Village wiped out.

T-8:

VILLAGE E

Move #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Visit I	X	X	X				X	X	X			X		X			
Visit G		X			X		X	X	X		X				X		X
Loyalty	G	G	G	G	G	G	G	G	G		N	I	I	I	I		I
Population																	
Impress								20									
Ambush						12							22				
Outcome																	

SUMMARY:

Visits: 8 (Ins.); 8 (Govmt.)
Initial Government loyalty turned to Insurgent.
Government ambushes ineffective.

Summary, Game 9

The ninth game was a long one. It involved a pattern of early government strength gradually decaying as the government proved unable to do much to eradicate the insurgents. The insurgents went from early rashness--during which they were almost wiped out--to a policy of caution and propagandism.

The game began with the insurgents visiting several villages and the government following and leaving several ambushes. In the second move cycle the insurgents decided to begin impressing men, and lost a 21 man recruiting force to a government ambush in village A. The dynamic strategy of the government was paying off, both in insurgent casualties and village loyalties. There were four villages loyal to the government at this point, and the insurgents had lost more than twenty percent of their forces. Had the government been able to maintain this position for two more move cycles, the game would have been over, the insurgency "nipped in the bud." The government kept the loyalty of four villages for the next four moves, but the insurgents built up strength above the minimum in move cycle three. However, attrition due to losses of probes to the now prevalent (all villages but D) government ambushes pushed the insurgent strength below the minimum for move cycles four and five.

Seeing the desperate position in which they were, the insurgents took their entire force and with intelligence gathered from village C, counter-ambushed and destroyed a 41 man government ambush there. They impressed 10 men, which placed their strength above the minimum and were never again in trouble. As the news of their success spread, their intelligence improved, they were able to increase their forces slowly to a winning level, and most importantly, they were able to avoid large losses due to ambushes.

As time went on and the government ambushes remained "un-sprung", the credibility of imminent government victory diminished. The insurgents refrained from becoming involved in engagements, but made their presence known by small probes and intense propagandism. Government loyalties decayed, and by the thirteenth move cycle the insurgents had won.

T-9:

VILLAGE A

Move #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Visit I		X				X											
Visit G	X	X		X					X		X			X			
Loyalty	G	G		G	G	G	G	G	G		G	G	G	G	G		
Population																	
Administration	A	A	A	A	A	A	A	A	A		A	A	A	A	A		
Impress	G					10		5									
Ambush	G	30			35												
(Winner) Outcome		G			G												

SUMMARY:

Visits: 2 (Ins.); 5 (Govmt.)
Strong Government loyalty, reinforced by two successful Government ambushes.

VILLAGE B

Move #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Visit I	X			X													
Visit G		X				X						X	X	X			
Loyalty	G	G	G	G		G	G	G	G	G		G	G	G	G		
Population																	
Administration	A	A	A	A		A	A	A	A	A		A	A		A	A	
Impress	G			10				5									
Ambush	G	30			50				40								
Outcome						G											

SUMMARY:

Visits: 2 (Ins.); 5 (Govmt.)
Solid Government loyalty.
3 Government ambushes, 1 successful.

T-9:

VILLAGE C

Move #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Visit I	X	X					X			X		X			X		
Visit G	X			X		X			X	X			X	X			
Loyalty	G	G	G	G		G	G	I	I	I		I	I	I	I		
Population																	
Administration																	
Impress I							10										
Impress G						10											
Ambush I																	
Ambush G	30					40											
(Winner) Outcome		G						I									

SUMMARY:

Visits: 6 (Ins.); 7 (Govmt.)
Loyalty shift: "Government cannot win because it has too few forces."
(following loss in Insurgent counterambush)

VILLAGE D

Move #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	1
Visit I		X	X														
Visit G							X						X	X			
Loyalty	G	N	I	N		G	G	G	G	N			N	I	I		
Population																	
Administration																	
Impress I																	
Impress G		10											10				
Ambush I																	
Ambush G		30					50						40				
Outcome			G														

SUMMARY:

Visits: 2 (Ins.); 3 (Govmt.)
Loyalty shifts: effect of Government victories.
other villages seem pro-Insurgent
Government impressment backfired.

Summary, Game 10

The tenth game was the shortest on record. It was unique in that there were no engagements between the belligerents, and the outcome was decided by the village's reaction to the government's hyper-active impressment.

The government plan was to impress constantly for the first few moves. It was felt that the villagers resented impressment only when village strength was at a level of 70 or 80 men. By quick impressment the government hoped to force the insurgents into impressing villagers at a point in the game when there was a great deal of resentment associated with the impressment.

The insurgents, on the other hand, hoped to utilize minimal impressment and avoid as much resentment as possible. As a result, they impressed only 10 men in one village during the whole game--10 men being sufficient to increase their 50 man force by twenty percent and satisfy the strength requirement.

In the first move, village D decided to promote the formation of a coalition for the purpose of ending the game as quickly as possible. By the third move cycle B and C had joined the coalition, but the government had become so unpopular with other villages that the game ended before the coalition's effect could be felt.

The government impressed 10 men per village in villages A, B, C, D, and E in the first, second and third move cycles. The loyalties of these villages all shifted to pro-insurgent in the second move cycle, except for E, which waited until the third move cycle to become pro-insurgent. The insurgents impressed 10 men in the first cycle in village D, and having met their strength requirement, waited out the three move cycles until the government had defeated itself.

T-10	VILLAGE A
Move	1 2 3 4 5 6 7 8 9 10 11 12
Visit	I X X G X X X
Loyalty	G I I I
Pop.	90 80 70 70
Admin.	- A A
Impress	I G 10 10 10
Ambush	
Outcome	

SUMMARY:

Pro-government, turning pro-insurgent Village went pro-insurgent because of government overimpressment.

T-10	VILLAGE B
Move	1 2 3 4 5 6 7 8 9 10 11 12
Visit	I X X G X X X
Loyalty	N I I
Pop.	90 80 70
Admin.	- - -
Impress	G 10 10 10
Ambush	
Outcome	

SUMMARY:

Member of 3-village coalition, Government overimpressed troops.

T-10	VILLAGE C
Move	1 2 3 4 5 6 7 8 9 10 11 12
Visit	I X G X X X
Loyalty	N I I
Population	90 80 70
Admin.	A - A
Impress	I G 10 10 10
Ambush	
Outcome	

SUMMARY:

C a late joiner of the coalition (B-C-D).
GOVERNMENT overimpressed.

T-10	VILLAGE D
Move	1 2 3 4 5 6 7 8 9 10 11 12
Visit	I X G X X
Loyalty	N I I
Population	80 70 60
Admin.	- - -
Impress	I 10 G 10 10 10
Ambush	
Outcome	

SUMMARY:

Village D main force behind coalition.

T-10	VILLAGE E
Move	1 2 3 4 5 6 7 8 9 10 11 12
Visit	I X G X X X
Loyalty	N N I
Population	90 80 70
Admin.	A - -
Impress	I G 10 10 10
Ambush	
Outcome	

SUMMARY:

Government overimpressment.

T-10	VILLAGE F
Move	1 2 3 4 5 6 7 8 9 10 11 12
Visit	I X X X G X
Loyalty	N G G G
Population	100 70 70 70
Admin.	- A A A
Impress	I G 30 recruits
Ambush	
Outcome	

SUMMARY:

Village began neutral, on last move gave loyalty and 30 recruits to government.
At end of game, F was only pro-government village.

Summary, Game 11, 20 May 1965, MIT II

The game began with impressments of 10 villagers and elimination of administrators from each of 3 villages by the insurgents. These impressments served to increase his forces to meet half of the criteria for winning. The government responded by placing sizeable ambushes in all villages and also impressing 10 men from each of 3 villages. The insurgent then tested for ambushes by visiting each village with one man. He encountered ambushes in every village and subsequently adopted a "waiting" strategy by taking no action at all during his next 5 moves. This was followed by single visits per move with his entire force. These actions resulted in successfully overpowering government ambushes in 2 out of 4 visits (plus a successful raid on government home base). The insurgent hoped that waiting it out would minimize his losses, create tension, and confuse the government. His single strikes with his entire force and his precaution of leaving no ambushes vulnerable to government attack were planned to add to his image of "no losses" and demonstrate strength. This could possibly create a feeling of discontent with the government by the villages by demonstrating that it would be a long drawn-out struggle that the government could not end but could be stopped by shifting loyalties to the insurgent.

The government concentrated on strategies that were planned to reduce the insurgent population, since he always had the loyalties of most of the villages. His initial actions placed sizeable ambushes in many villages. He then randomized the strengths and locations of the ambushes, hoping to eventually overcome a large visiting insurgent force. This process was continued throughout the game even though the insurgent did not even come out for several consecutive moves. When the Government encountered extreme difficulty in luring out the insurgent for battle, the ambush pattern was changed to several small groups which the insurgent could easily overcome and one large group that would be difficult to overcome--especially with cooperative pro-government villages. At one point the government made plans with a village to remove all troops and urge the village to seek an insurgent ambush that subsequently could be countered.

As the government forces dwindled toward the end, his strategy resolved into leaving and removing a single overwhelming ambush in one village (and impressing additional men).

The game was arbitrarily stopped after 3-1/2 hours of actual play since the hour was late, the limit of human endurance was approached, and no strong trend toward the winning criteria was revealed.

T-11:

VILLAGE A

Move #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Visit I	X	X	X											
Visit G	X		X	X		X	X	X	X	X		X	X	X
Loyalty	G	G	G	G	G	N	N	N	N	G	G	G	G	G
Population	80	77	77	78	78	78	78	79	80	81	82	82	82	82
Admin.			Y	Y						Y	Y	Y	Y	
Impress I	10													
Impress G	10											10		20
Ambush	30	30	30	20	20					80	80		80	
	G	G	G	G	G					G	G		G	
Outcome I		G	G											
Outcome G		-II	-II											
Killed		3 crossfire										20 by G		

SUMMARY:

Visits: 3 (Ins.); 11 (Govmt.)
Pro-government, then neutral. finally pro-government.
8 government ambushes (2 successful).

VILLAGE B

Move #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Visit I	X	X	X											
Visit G	X		X		X		X	X		X			X	X
Loyalty	G	G	N	N	G	G	G	G	G	G	G	G	G	G
Population	80	74	74	74	74	74	74	77	78	78	80	80	81	81
Admin.				Y		Y		Y		Y			Y	Y
Impress I	10													
Impress G	10													
Ambush		30	30			30	30	30	30	30				
		G	G			G	G	G	G	G				
Outcome I			-II											
Outcome G				-II										
Killed			6 crossfire											

No protect. G troops from G. for protect.

SUMMARY:

Visits: 3 (Ins.); 8 (Govmt.)
Predominantly neutral and government.
7 unsuccessful government ambushes, 1 insurgent counterambush.

T-11:

VILLAGE C

Move #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Visit I	X	X	X								X	X	X	
Visit G	X	X		X	X		X	X		X	X			
Loyalty	G	G	G	G	G	G	G	G	G	N	N	N	N	G
Population	80	79	79	-	80	81	82	83	84	85	85	56	2	2
Admin.	N	N	Y	Y	-	Y		Y		Y	N	N	N	N
Impress I	10					(10)	9	8						
Impress G	10				(9)	(8)	7	7				(-2)		
Ambush I														
Ambush G	30	40	→											
Outcome I			3											
Outcome G		1I killed									3G			
Killed		1		3 lost			1					20		

"Government removes ambush of 40, much to dismay of village"

"Government mistake forces V. neutral."

"G attempts to Impr. 9 men, v. hostile act"

VILLAGE D

Move #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Visit I	X	X	X						X					
Visit G		X	X	X	X	X	X	X	X	X		X	X	
Loyalty	G	G	G	G	G	G	G	G	G	G	G	G	G	G
Population	100	90	90	90	91	91	91	91	81	71	71	71	62	63
Admin.	Y	Y	-	Y	Y	Y	Y	-		Y	Y	Y	Y	Y
Impress I									10					
Impress G		10								10			10	
Ambush I										I				
Ambush G		30	10	40	40	20	40	20						
Outcome I			-1I							I				
Outcome G			G							-20G	2			
Killed									2 crossfire					

T-11:

VILLAGE E

Move #		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Visit	I	X		X									X		
	G	X		X	X	X	X	X	X	X			X	X	X
Loyalty		G	N	N	G	G	G	G	G	G	G	G	G	G	N
Population		90	90	90	-	95	95	-	95	95	95	95	85	85	75
Admin.		Y	Y	-	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y
Impress	I												10		
	G	10													10
Ambush		30 G	30 G	50 G	20 G	20 G	40 G	20 G	4 G	4 G	4 G	4 G			X
Outcome	I			①	5										
	G			desert									-4		
Killed															

Ins. followed advice about staying away.

G keeps promise returns 5 men.

Ambush w/o village consent.

SUMMARY:

Visits: 3 (Ins.); 11 (Govmt.)
Varying neutral and government loyalty.
Government impressment twice that of Ins.
11 uneventful government ambushes.

Summary, Game 12, 15 June 1965

On 3 June, the latest modification of the game of TERROR was played at Abt Associates Inc. The only change from the previous play (TERROR-11) was the denial to the villagers of access to the full rules of the game. Instead, the villagers were presented with a heavily censored version of the rules, from which all numerical data were deleted. In addition, the substantive rules given to the villagers included only that information which is necessary for them to go through the mechanics of play. Thus, except in the broadest of terms, the villagers were not aware of the consequences of their play and, in particular, were not really aware of the powers of and the constraints on the belligerents. The villagers were, however, informed that the belligerents knew all information which had been censored out of the villagers' rules, and that they could attempt to learn these rules from the belligerents. The belligerents were, moreover, entitled to mislead the villagers as to the nature of the actual rules.

This modification to the game was motivated by the suggestion that the full knowledge by the villagers of all the rules represented a high degree of political sophistication on their part which is generally absent in real life. At the same time attempts by the belligerents to impart their own versions of the rules would correspond to real world political indoctrination.

The results of this first play with "politically naive" villagers can best be stated as "not proven" since by and large neither of the belligerents exercised their opportunity to take advantage of the villagers' ignorance. This was probably due to the belligerent players being conditioned by previous games in which the villagers knew as much of the rules as the belligerents. The insurgents did attempt to propagandize the point that they needed the loyalty of fewer villages to win, but this point was not made convincingly enough to outweigh the effects of insurgent military losses. In any event, neither the quality of play nor the basic understanding of the game on the part of the villagers suffered because of their ignorance. It is therefore recommended that the separate village rules be maintained in future play and that "political indoctrination" by the belligerents be encouraged so that its effect may be observed.

The action of the game, which resulted in a decisive government victory, was based primarily on military actions, which were, in turn, based on excessive

risk-taking by the insurgents and acting on faulty intelligence, these being classical insurgent mistakes. The game opened with the insurgents impressing equally from all five villages, well exceeding their required quota of recruits. The government responded by leaving three 45 man ambushes. The insurgents, through eavesdropping learned of one of these and successfully attacked it. The confusion resulting from this atack, with all neighboring villagers honestly claiming to be innocent of the betrayal, might have been very damaging to the government, if it had been exploited by the insurgents. Instead the insurgents chose to attack another suspected ambush with a major force without prior verification of the ambush, relying on main strength rather than updating their intelligence. The insurgents paid for this classical error with a decisive military defeat which left the insurgents sufficiently weak in numbers that the government, by leaving ambushes, was then able to deny them further access to the villages. The weakness of the insurgents became apparent to the villagers, all of whom ultimately sided with the government. Just before the end of the game, the insurgents, in an effort to attrit government loyalty and thereby buy extra time, returned all impressed men. This was interpreted as a sign of further weakness. By the end of the game, the insurgent side was reduced to three men, from a starting point of sixty and a high water mark of one hundred.

The all-or-nothing aspect of military engagements in the game had been criticized before. The engagement rules were therefore changed for this game to provide 20 percent losses to the victors and 20 percent survivors to the losers. This did not apply to one-man probes and was modified to guarantee that there were more survivors on the winning side than on the losing one. Even with this rule, the single defeat of the major insurgent force (100 insurgents ambushed by 55 government troops, leaving 20 insurgent survivors and 45 government survivors) was still decisive in the game, demonstrating the preeminent value of intelligence as opposed to brute force.

T-12		VILLAGE A							
Move		1	2	3	4	5	6	7	8
Visit	I	X			X	X		X	
	G		X		X	X		X	
Loyalty		G	G	G	G	G	G	-	G
Population		90	90	90	90	90	90	-	91
Admin.		Y	Y	Y	Y	N	N	-	-
Impress		10 I			8				
Ambush			25 G	25 G				35 G	
Outcome	I G				-1				
Killed		V			2				

T-12		VILLAGE B							
Move		1	2	3	4	5	6	7	8
Visit	I	X	X	X	X	X	X	X	
	G	X	X		X	X			
Loyalty		G	N	N	G	G	G	G	
Population		75	75	75	68	68	68	62	
Admin.		Y	Y	Y	Y	Y	Y	Y	
Impress		10 10							
Ambush		45 G	55 G		45 I	30 G	35 G		
Outcome	I G		-1		? 10	1	-1	-1	
Killed		V	-5		12			6	

"Failure of G to provide protection"

"Pro-G because sufficient protection given"

SUMMARY:

--Visits: 4 by Insurgents, 4 by Government

--Constant Government loyalty

--3 Relatively uneventful Government ambushes

--2 Villagers killed in crossfire

SUMMARY:

--Visits: 7 by Insurgents, 4 by Government

--Predominantly Government loyalty

--Equal impressment by both sides

--4 Relatively uneventful Government ambush, 1 Insurgent ambush killed 10

--High crossfire losses (23 dead)

T-12		VILLAGE C							
Move		1	2	3	4	5	6	7	8
Visit	I	X	X	X	X			X	
	G	X	X	X	X	X	X		
Loyalty		G	G	G	G	G	G		G
Population		80	74	63	59	59	54	65	65
Admin		Y	Y	N	Y	Y	Y		-
Impress	I	10		10					(-9)
	G	10							
Ambush	I								
	G	45	10		30	50	30		
Outcome	I		?				1		
	G		-5	-10			0		
Killed			6	5		0	6		

SUMMARY:

--Visits: 5 by Insurgents, 6 by Government

--Constant Government loyalty

--5 Government ambushes; 2 Insurgent ambushes

--12 Villagers killed in crossfire,
5 Villagers killed by Insurgents

--Insurgent impressments twice Government impressments

T-12		VILLAGE D							
Move		1	2	3	4	5	6	7	8
Visit	I	X	X	X			X	X	
	G	X							
Loyalty		N	N	N		G	G		G
Population		90	75	71		71	71		71
Admin		Y	Y	Y		Y	Y		Y
Impress	I	10							
	G	10							
Ambush	I								
	G	45							
Outcome	I		-1						
	G								
Killed			-5						

(way of G) "Better admin & full protection"

SUMMARY:

--Visits: 5 by Insurgents, 1 by Government

--Neutral, then pro-Government

--1 Uneventful Government ambush

--5 Villagers killed in crossfire

T-12		VILLAGE E							
Move		1	2	3	4	5	6	7	8
Visit	I	X				X	X		
	G			X		X		X	
Loyalty		I	I	I	I	N	G		G
Population		90	90	90	90	80	80		78
Admin			Y	Y	N	N	N		Y
Impress	I	10							22
	G					10			
Ambush									
Outcome									
Killed									

"30 troops & new administrator protection"

"heading towards neutrality"

SUMMARY:

--Visits: 4 by Insurgents, 3 by Government

--Early Insurgent loyalty changing to Government loyalty

--Both sides impressed men

--No military activity

Summary, Game 14, 25 June 1965, Prof. Pool's Residence

Game 13 was played with flow charts to check their completeness and is not included here. Flow charts are in Appendix C.

The game began with the insurgent's impressing 10 men from each village and killing government administrators. Then both belligerents entered into a propaganda contest with visits to almost all villages with small forces on every move. On move 6 the government left a 50 man ambush in village 3. The ambush killed a single insurgent visitor on the next move, and it was then increased to 60. The insurgent was warned of this situation by village 4 and then encountered the ambush with a superior force. After this skirmish the game again settled down to propaganda and intelligence visits by small forces. The insurgent had sufficient forces to meet half of the win criteria due to his initial impressments, but by this time had convinced only 2 villages to swing away from their initial government loyalties (three are required to win). In an effort to stop insurgent visits with small forces and lure him into visits and ambushes with large forces, the government left relatively small (10 man) ambushes in every village. The insurgent encountered 3 of them, winning 2 and losing 1, and wiped out one village. He also left a 31 man ambush in his only loyal village at that point which lost an engagement with 120 government troops on the next move. The game was then stopped after 3-1/2 hours of actual play and declared a stalemate. The insurgent had lost heavily in the last move and had the loyalty of only one village; the government was denied victory because of the elimination of a village.

Fig. 8 T-14 VILLAGE 1 Dr. Rosner, Chief; Capt. Carnigan; Meyfarth

Move #	1 2	3 4	5 6	7 8	9 10	11 12	13 14	15 16	17 18	19 20	21 22	23 24	25 26	27 28	29 30
Visit I G	X	false ambush warning X	X	X	X	X	X	-	X	-					
	X	X	X	-	X	-	X	-	X	X					
Loyalty Predicted Winner	N N ? ?	N N I I	N N ? ?	N G ? G	G G G G	G G G G	G G G G	G G G G	G G G G	G G G G					
Population	100 90	90 91 escaped from Ins.	91 91	91 92 returned from Ins.	92 92	92 92	92 92	92 92	92 92	92 92					
Admin.	A I	A A	A A I												
Impress	10 I														
Ambush									10 G						
Outcome															
When do you think game will end? (cycles)	10	?	?	2 ↑ checks with loyalty change.	1	1	?	?	?	-					

Communications: Worried about Govt. killing 10 at "random" in Village 4 on Move 6. Note immediate shift to Govt. loyalty--even without visit by Govt. Then began to request Govt. "protection" to avoid Insurgent impressment. Interpreted Insurgent's killing Administrator in Move 1 as hostile act--then gave false ambush warning to keep the Insurgent away. After switch to Govt., actively propagandized other villages to support Govt.

Stated strategy was "playing one side against the other." Impressment by Insurgent reinforced identification of "the enemy."

Fig. 9 T-14 VILLAGE 2 Col. Yates, Chief; Siemens

Move #		1 2	3 4	5 6	7 8	9 10	11 12	13 14	15 16	17 18	19 20	21 22	23 24	25 26	27 28	29 30
Visit	I	X	X	X	X	X	X	X	X	X	-					
	G	X	-	-	X	X	X	-	-	X	X					
Loyalty / Predicted Winner		G/G G/G	G/G G/G	G/G G/G	G/G G/G	G/G G/G	G/G G/G	G/G G/G	G/G G/G	G/G G/G	G/G G/G					
Population	100	90 90	90 90	90 90	91 91	92 92	92 92	92 92	92 92	92 92	92 92					
				returned by Ins.		returned by Ins.										
Admin.		A A	A -	-	A	A A	A -	-	-	-	-					
		↓	↓			↓	↓									
		I	I			I	I									
Impress		10 I								10 G						
Ambush																
Outcome																
When do you think game will end? (cycles)		7 10	6	6	5	4	3	2	1	1	-					

By Move 3, villager stated "no decisive action appears likely on either side." Never had cause to change loyalty from original Govt. position. Arrangement was made with Govt. in first move to appear loyal to Insurgent, but support Govt. Actual functions included: Providing accurate information, especially important was passing on a note received from Village 5 about its loyalty shift away from Govt. in Move 10; Propagandizing pro-Insurgent Village 4; Winning Insurgent confidence by killing Govt. Administrator with full knowledge and support of Govt.; Appearing to be ignored by the Govt.; Assisting in Govt. planning (idea of placing ambushes without Administrators and implying presence of ambush where there was none with a visible Administrator).

Fig. 10 T-14 VILLAGE 3 Feldstein, Chief; Laiquen

Move #	1 2	3 4	5 6	7 8	9 10	11 12	13 14	15 16	17 18	19 20	21 22	23 24	25 26	27 28	29 30
Visit I	X	X	X	X	X	X	X	X	X	X					
Visit G	X	X	X	X	X	X	X	X	X						
Loyalty	G G	G G	G G	G G	G G	G G	G G	G G	G G	G G					
Predicted Winner	G G	G G	G G	G G	G G	I I	I I	I I	I I	I I					
Population	100 90 90	90 90	90 90	90 90	68 68	48 48	48 54 ret. by G	52 58 ret. by G	58 57	wipes out 0					
Admin.	A A	A A	A -	-	-	-	-	-	-						
	I	I	I												
Impress	10 I				10 I	20 G		2 I							
Ambush				50 G	60 G				6 I	6 G					
Outcome				G I-1	I G-40 I-10 V-12				G I-5 G-4 V-1	I G-6 V-57					
When do you think game will end? (cycles)	-	8	7	6	- shocked!	5	3	5	4	4					
Village Resistance							I-1	-							

Insurgent promised return of villagers & village requests no more Administrators (Move 5). Harbors large Govt. ambush which Insurgent overcomes. Feels guilty. Insurgents take reprisal (Move 10). Winner estimates now I but village still pro-Govt. Dilemma: Feels Insurgent winning but feels village not trusted by Insurgent. Feels that a switch to Insurgent loyalty would not result in his winning because of previous population losses. Resolved by offering to harbor large Govt. ambush to kill Insurgents and suffers crossfire losses in hope of denying victory to the Insurgent. Final ambush series and destruction of village resulted in his concluding that the Insurgent would surely win.

Fig. 11 T-14 VILLAGE 4 Prof. Pool, Chief; Maj. Michael; Miller

Move #	1 2	3 4	5 6	7 8	9 10	11 12	13 14	15 16	17 18	19 20	21 22	23 24	25 26	27 28	29 30
Visit I	X	X	X	X	-	X	X	X	X	X					
Visit G	-	X	X	X	-	X	-	X	X	50 X 120					
Loyalty / Predicted Winner	G/I G/I	G/I N/I	N/I I/I	I/I I/I	I/I I/I	I/I I/I	I/I I/I	I/I I/I	I/I I/I	I/? I/?					
Population	100 90 90	90 90	90 80	85 85	85 85	85 85	85 85	85 85	85 85	70 70					
				ret. by Ins.											
Admin.	A↓I	A	A↓I -			-		A	A↓I						
Impress	10 I														
Ambush									10 G	31 I					
Outcome									I	G					
									G-9	I-28 V-15					
Killed			.10 G												
When will game end? (cycles)	5	3	2	1	1	1	1	1	?	-					

The initial shift to neutral was because "Govt. lied, Insurgent looks strong, Insurgent promised to return men." The shift to Insurgent was a direct reaction to Government's killing 10 villagers as a reprisal for village's killing their Administrator and simultaneously sending the Govt. a note blaming the Insurgent which the Govt. knew to be false. Govt. evidence was an eyewitness account from an adjacent village Administrator. Insurgent loyalty was further reinforced by his returning the villagers as promised. Insurgent losses in the final ambush cast doubt that he would win.

The village was in a good physical position to observe the initial Insurgent impressment and the Insurgent ambush victory in Village 3, Move 9. Except that village was influenced by the fact that neutral vilages couldn't win; it expected game to end early, and chose to stick with the side that was apparently stronger.

Fig. 12 T-14 VILLAGE 5 Krogh, McDowell

Move #		1 2	3 4	5 6	7 8	9 10	11 12	13 14	15 16	17 18	19 20	21 22	23 24	25 26	27 28	29 30
Visit	I	X	X	X	X	X	X	X	X warning zone only	X	X					
	G	X	X	-	-	-	X	X	70 X	X	X					
Loyalty / Predicted Winner		G/I	G/I	N/I	N/I	I/I	I/G	N/G	G/G	G/G	G/G					
			wants G to win		wants G to win											
Population	100	90 90	90 90	90 90	91 91 ret. by Ins.	91 91	91 91	91 91	91 91	91 91	85 85					
Admin.		A ↓ I	A	A ↓ I			A	A ↓ I	A ↓ I							
Impress		10 I														
Ambush										10 G	7 G → G					
Outcome											G-3, V-6 I-7					
When do you think game will end? (cycles)		10	10	10	3	1	2	3	1	2	-					

Village was not too concerned about population losses because it was never a serious problem. It did not consider the initial Insurgent impressment severe. It was very concerned about loyalty and was very active in message writing to other villages to influence them and ask their loyalties. Village loyalty changes were entered into with a great deal of inertia. The shift to Neutral in Move 3-4 was accompanied by a desire for the Govt. to win even though they thought the Insurgent would. The desire lingered and turned into an actual expectation of a Govt. win in 7-8 until the successful Insurgent ambush in Village 3 and the return of a villager pushed them into Insurgent loyalty. The Insurgent misperceived their helpful suggestions and arguments as neutral or Govt. loyalty. They then began to feel the Govt. would win but maintain Insurgent loyalty for a cycle (11-12) before going through Neutral to Govt. loyalty. They then were extremely agreeable with the Insurgent which he again misperceived as favorable loyalty. This last shift was prompted by a village threat to the Insurgent to switch to Govt. loyalty that appeared to cause concern to the Insurgent. This concern was interpreted as weakness by the village inspite of Insurgent efforts to act cool. Govt. was aware of their Insurgent support because village 2 passed on their campaign notes. Govt. finally got tough--verbally--in 11-14 and put in Administrators to check loyalty shift.

Summary, Game 15

The insurgents opened in village A by impressing 10 men. A few moves later they impressed 10 more, the last such action they were to take there. They impressed a total of 45 men from village B, and were considerably harsher there than in village C.

The government began by leaving 75-man ambushes in villages A and C, with both belligerents trying to sway B from its position of neutrality. Warned by village A, the insurgents were able to kill 65 government troops in a counter-ambush. The government also left 61-man ambushes in villages B and C, but could knock out only a single-man patrol before the game ended.

When the game was called, village C was pro-government, B was neutral and A was 1/3 insurgent and 2/3 neutral. The insurgents had gained forces through impressment but had insufficient success in winning popular loyalty.

The government impressed villagers in order to have leverage in forcing the villagers to be on good behavior, but village loyalty reports suggest that impressment efforts may have backfired, since the highest insurgent sympathy was found in the village of earliest impressment, while the greatest government loyalty was in village C, where the government did not impress.

Many players on both sides thought that the best government strategy involved (at least in part) a large roving ambush. However, as the government's large-ambush policy lost credibility as an effective and convincing tactic, the government lost allegiance in all villages except C and eventually placed more emphasis on smaller patrols.

Insurgent tactics involved primarily a roving and probing force which occasionally clashed with government troops. They sent out numerous one-man recon patrols, relying on these and village warnings to reveal government ambushes. The insurgents left no ambushes in the villages, but performed a number of counterambushes.

Additional components of insurgent strategy were to:

1. Execute village administrators immediately, to deny the government vital information and village contact. (There was seldom any village opposition to losing administrators. Village A preferred it as an aid to their playing both sides in the conflict.)
2. Reward loyal villages and punish neutral or pro-government villages which continued to frustrate them in the latter stages of the game.
3. Stress the bestiality (but not weakness) of the government while proclaiming its own military power (while neglecting to take advantage of its early counterambush victories).

Village A sought to play a survival game by being nice to both sides and, if possible, confusing them so as to prevent their taking decisive action in the village. Village B began neutral, then switched to pro-government on receiving pro-government loyalty information from the other villages.

But village B grew impatient with government inability to win and shifted back to a firm neutrality policy. Village C was initially neutral, but changed to pro-government on move 8 and remained loyal for the remainder of the game (due to insurgent impressment and feelings of strong government presence).

T-15 VILLAGE A (Chief) Kaiser; Rosen; Zonis

Move #		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Totals
Visit:	I	30	1	40	2	-	70	1	-	5	1	1	1		50		X	-
	G	75	2	2	2	-	90	15	1	1	2	6	1	10	20	1	6	-
Loyalty and Faction	L	N	N	N	N	N-I	N-I	N-I	N-I	I	N	N	N-G	N-I	N	N	N	→ N
	C	N-I	I	N	I	N	I	N	I	N	N	G	N-I	N	N	I	I	→ I
	R	N	N	N	N	N	N	N	N	N-I	N	N	N	N	N	N	N	→ N
Population		77	84	?	78	78	51	55	58		58	62	64	64	69	59	84	→ 84
Administrator	I	K	-	K	K	-	K	-	-	-	-	K	K	K	-	-	-	→ 7
	G	R	→	R	R	→	-	-	-	-	R	R	R	-	-	-	-	→ 7
Impress	I	+10	-	(+10)	-2	-	-	-	-	-5	-	-	-	-	-	-	-5	→ 8
	G	+6	-6	-	-	-	25	-5	-	-	-	-	-	-	-10	-	-10	→ 0
Ambush	I	-	-	(40)	-	-	-	-	-	-	-	-	-	(50)	-	-	-	
		(I warned of ctrambush by A)												(I warned of ctrainbush by A&C)				
	G	75 → 77 → X			-	-	-	-	-	-	-	-	-	10 → X		-	-	
Outcome	I	-	①K	⑤K	-	-	-		-	-	-	-	-	②K	-	-	-	→ 8
					3 vill. sacrificed													
	G			⑥⑤K	-	-		accid.	-	accid.	-	-	-	⑩K	-	-	-	→ 75
Killed		-	-	③K	-		②+1K I	①G	-	②I	-							→ 8

(See T-15 Summary)

T-15 VILLAGE B (Chief) Gorden; Pool, Humphrey

Move #		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Totals
Visit:	I	-	21	1	50	1	2	-	75	-	X	X	-	1	-	-	1	-
	G	-	30	2	100	2	1	-	1	1	-	1	-	20	61	90	X	-
Loyalty and Faction	L	N	N	N	N	N	N	G	G	G	G	G	N	N	N	N	N	→ N
	C	N	N	N	N	N	N	G	G	G	G	N	N	N	N	N	N	→ N
	R	N	N	N	N	N	N	G	G	G	G	G	G	G	N	N	N	→ N
Population		100	100	100	96	86	86	56	56	56	64	67	67	67	71	61	61	→ 61
Administrator	I	-	K	-	K	-	K		K	-	K	-	-	K	-	-	K	→ 7
	G	→	-	R	R	→	R	→	-	R	-	R	→	-	-	R	R	→ 8
Impress	I	-	10	-	15	-	-2	-	20	-	-10	-5	-	-	-	-	(13)	→ 15
	G	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-	→ 10
Ambush	I	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	
	G	-	-	-	100	(-100)	-	-	-	-	-	-	-	-	-	-	61	
Outcome	I	-	-	-	-	①killed	--	-	-	-	-	-	-	-	-	-	-	→ 1
	G	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	→ 0
Killed		-	-	-	-	-	① accid.		⑩ K by Ins.		-②$_I$	①$_I$	-	-	-	-	-	→ 14

(See Terror 15 Summary)

T-15 VILLAGE C (Chief) Saltzein; Li

Move #		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Totals
Visit:	I	1	1	-	-	50	-	2	-	1	1	-	-	-	-	70	-	
	G	X	2	2	2	1	-	1	100	X	110	1	-	1	X	-	-	
Loyalty and Faction	L	N	N	N	N	N	N	N	G	G	G	G	G	G	G	G	G	→ G
	C	N	N	N	N	N	N	N	G	G	G	G	G	G	G	G	G	→ G
	R	N	N	N	N	N	N	N	G	G	G	G	G	G	G	G	G	→ G
Population		97	100	97	97	77	77	83?	79?	79	79	79	79	79	79?	?	64	→ 64
Administrator	I	K	-	-	-	K	-	K	-	K	K	-	-	-	-	-	-	→ 5
	G	R	→	→	→	R	→	-	R	R	-	-	-	-	-	-	-	→ 5
Impress	I	-	-	-	-	20	-	-	-	-	-	-	-	-	-	10	-	→ 30
	G	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	→ 0
Ambush	I	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	G	75 →	77	– (-77)	-	-	-	-	-	-	61	-	-	-	(-59)	X	-	
Outcome	I	-	①	-	-	-	-	-	-	-	-	-	-	-	-	-	-	→ 1
	G	-		-	-	-	-	-	-	-	-	-	-	-	-	②K		→ 2
Killed		-	-	-	-	-	-	-	-	-	-	-	-	-	-	⑤ crossfire		→ 5

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	End Position	Debriefings G	Debriefings I
VILLAGE A	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N		Loyal to I	Playing 2-faced game
"All things to all men"	N	N	I	I	N	I	N	I	N	N	G	N	N	N	I	I	N		
	N	N	N	N	N	N	N	N	I	N	N	G	I	N	N	N			
VILLAGE B	N	N	N	N	N	N	G	G	G	G	G	G	G	N	N	N		Key to game--convince win by winning A-& C	Neutral & apathetic therefore (!) would b punished--would even tually go I to get peop back
											Aggressive behavior perceived as weakness		vs						
"No heroes us--non-involvement"	N	N	N	N	N	N	G	G	G	G	N	N	N	N	N	N	N		
										Effect of dire Ins. threats (terror)									
	N	N	N	N	N	N	G	G	G	G	G	N	N	N	N	N			
					Belief in G victory after hearing of other V's going G					G plea for I surrender showed G weakness									
VILLAGE C	N	N	N	N	N	N	N	G	G	G	G	G	G	G	G	G	G	Believed neutral--protection contingent	Assumed pro-G, kept clear
"Unified acquiesance to superior forces"	N	N	N	N	N	N	N	G	G	G	G	G	G	G	G	G			
Bluff to deter belligerent entry		Thought A pro-G, B uncertain			Result of impressment by Ins + strong G presence						G	G	G	G	G	G	G I	?	Rotating large ambush
										Claimed G ambush to deter I impress., prove loyalty									

Game 15

CONTROL RECORDS GAME 15

Move	Night/Day I/Govt	Ambushes N	Ambushes G	Ambushes I training	VILLAGE A	VILLAGE B	VILLAGE C
9	G				With 1, G claims all V's loyal, solicit intell	With 1, solicit intell	Put in adm
	I				With 5, to return them, 3 make it, 1 denies C is pro-G		With 1, kill adm, V asks other V loyalty, I claims A & B
8	G				With 1, notices no ambush	With 1, V declares G loyal (true), G think A in A	100 visit, V tells G that B is G (true) 6, solicit loyalty
	I					With 75, kill adm, kill 10 villagers, thinking them G, ask for 25 volunteers, impress 20	
7	G				With 15, return 5 (1 dies)		With 1, can G return men at end? possibly
	I				With 1		Kill admin, visit with 2, return them (1 dies)
6	G	All factions in all villages now N			With 90, G is angry impress 25	With 1, V asks how battle is going	
	I				With 70, ctr A, believing in A from false note kill betrayed pro G, kill admin.	With 2, return 2 men, 1 survives	
5	G					With 2, remove 100 ambush	With 1, tell of I's impress 20 men
	I					Visit, killed by A	Visit with 50, kill Admin, ask for 20 volunteers, get them
4	G	100B			With 2	With 100, leave as A, + admin	Visit with 2 P
	I				With 2, return 2 conscripts, kill admin	With 50, angry at lethargy, impress 15	
3	G				With 2, asked for info leave admin	With 2, asked info, leave admin	With 2, prop, removed ambush
	I				With 40, warning of A, I lose 5, G loses 65	Visit with 1, ask for men, rejected	
2	G				Visit with 2, discussed ambush	Visit with 30 Prop	Visit with P2, leave 2 + 75
	I				Recce with 1, killed by A	Visit with 21, kill admin., imp. 10	Visit with 1, killed by A
1	G	75A	75C		Came with 75, left 50 at Hq, left A 75		Left A of 75
	I				Came with 30, killed admin., impress. 10		Visit with 1, killed admin.

Move	Night/Day I/Gov't Ambushes				VILLAGE A	VILLAGE B	VILLAGE C
		G	I				
		G	I			END	
16		G	I		With 6, return 10 Return 5	Leave A of 61 With 1, killed adm	
15		G	I		With 1	With 90, leave A of 61, impress 10 as hostages for security of ambush	5 leave, 70 expecting ambush, kill 26, V loses 5 in crossfire, impress 10 as punishment
14		G	I		With 20 ctr ambush with 50, I lose 2 on warning from A & C	With 61	With 1
13		G	I		With 10	With 20 Come in with 1, try to recruit adm, then kill him	With 1
12		G	I	Warned of A in C, mistake not to recce	With 1, leave adm With 1, kill adm		
11		G	I		With 6, leave adm Come in with 1, kill adm	With 1 Return 5 (1 dies)--threat if unless intell, no more men ret	With 1
10		G	I		With 2, solicit info With 1	Returning 10 men (8 back) kill admin	With 110, leave 61 man ambush With 1, kill adm
		N G	I	training			

APPENDIX B

THE ARPA-AGILE-COIN MILITARY SCHOOL GAME

APPENDIX B

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TEACHING GAME

Introduction

This will introduce the AGILE-COIN Game, an exercise designed to demonstrate some of the important political and operational factors in the transition from the terrorism phase to the guerrilla warfare phase of insurgency.

The game may be played by training groups ranging from fifteen to over fifty men. A minimum time of four hours is recommended: at least one hour for briefing and rule familiarization which should include a short demonstration game; two to two and a half hours of actual play; and one-half to one hour for de-briefing and discussion of results. More than two hours' play is usually required for the belligerents to perceive each others' strategies and have time to respond effectively.

It has been our experience that players learn most by playing each major role twice--the first time for familiarity and the second for experimenting with strategies and tactics. Since there are three major roles (Insurgent, Villager, Government), this suggests a minimum of six game experiences per student, or a total time allocation of 24 hours or three days.

The physical space requirements vary with the number of players and teams. The minimum-size game of twenty players (including two referees) on six teams (Control, Insurgent, Government, plus three Village Teams) requires five small rooms on a common corridor (or an average back yard with five clumps of bushes or tents). If larger teams are desired, more space per team must be provided. If more teams of the minimum size (3 in villages, 2 on belligerents, 2 on control) are desired, more separate rooms will be needed.

Ordinary tables and chairs may be used in the rooms. (No furnishings are needed if the game is played outdoors.) Game equipment consists of rules, forms, and simple counters representing people. No special equipment or hardware is required.

Minor additions have been made for the teaching game that involve primarily the mechanics of record-keeping on populations held by all players, the rapid calculation of outcomes of military engagements, reporting and display requirements, and win criteria. These changes have been incorporated in the game materials presented in this Appendix.

Introduction to Game Details

For players with limited or varied experience, it is wise to have an appropriate briefing session: well-organized, succinct, and just as long as is required to orient the players on the general game procedures in order to preclude gross confusion at the early stages of play. A short demonstration game of about thirty minutes duration with five minute moves is recommended as a part of the initial orientation.

Moreover, much of the learning the player acquires from these game exercises is summarized and highlighted during the debriefing sessions and in further post-game analysis. In order to provide the necessary data for these activities, the players should be urged to submit the reports called for during the game promptly, to keep copies of their correspondence, and to record other information on motives, attitudes, and strategies.

Members of the Control team will play a vital role in expediting game actions. Wherever possible, extra players should be assigned to the Control team (these do not need to be students), with a Control member assigned to each belligerent and each village ideally. He could keep accurate count of populations, prepare the loyalty forms, and answer procedural questions on game rules, legitimate tactics, etc.

It is also emphasized that village players incur no penalty for indicating sympathy with the Insurgents, other than what the Government team can do, should these sympathies come to the government's notice.

Control members should have a thorough knowledge of the rules before the game. The belligerents should be briefed on the game details and given a short period to prepare strategies. Then the villagers should be given an abbreviated briefing on game rules using the villager rule sheets as a guide. Villagers then proceed to their respective village areas with one Government Administrator per village (if assigned by the government) and wait until the game begins. Players should be encouraged to ask questions during the briefing sessions and all procedural questions should be answered.

After the debriefing, all players should complete a copy of the game critique and submit all their notes and recorded materials to Control.

It is estimated that the game design team can train instructors in operating and supervising the game in one full day.

TYPICAL SPACE REQUIREMENTS

Number of Players	Number of Teams	Number of Rooms	Size of Rooms
20	1 Control (2 ea) 2 Belligerents (2 ea) 3 Villages (3 ea) 3 Administrators 2 Couriers	5	100 ft.^{2}
26	1 Control (2 ea) 2 Belligerents (2 ea) 3 Villages (5 ea) 3 Administrators 2 Couriers	5	150 ft.^{2}
	OR		
28	1 Control (2 ea) 2 Belligerents (2 ea) 5 Villages (3 ea) 5 Administrators 2 Couriers	7	100 ft.^{2}
35	1 Control (3 ea) 2 Belligerents (3 ea) 3 Villages (7 ea) 3 Administrators 2 Couriers	5	200 ft.^{2}
	OR		
39	1 Control (3 ea) 2 Belligerents (2 ea) 5 Villages (5 ea) 5 Administrators 2 Couriers	7	150 ft.^{2}
	OR		
39	1 Control (3 ea) 2 Belligerents (3 ea) 7 Villages (3 ea) 7 Administrators 2 Couriers	10	100 ft.^{2}

INSTRUC TOR'S GUIDE
ARPA - AGILE COIN GAME

The following check list should be used for game preparation, operation and post-game analysis.

I. Game Preparation

A. Players

The game should have a minimum of 20 players. Any number from 20 to about 50 can be accommodated. The village players should be divided into from 3 to 7 groups with from 3 to 7 players in each group to form villages. The Insurgent team should have from 2 to 5 players; the Government should also have from 2 to 5 principal players and at least enough administrators for 1 per village. A courier should be provided for each belligerent team, and 2 to 5 people can be used on the Control team.

B. Facilities

Each village group should have its own space that permits limited communications between the groups. The belligerent teams should each have separate headquarters that can be isolated from the game action.

C. Materials

Before the game begins, each player should be given rules and procedures appropriate to his part and given time to study them and formulate questions. Belligerent folders should contain:

1. Rules for Belligerents
2. Rules for Villagers
3. Suggestions for Play
4. Critique forms
5. Message forms
6. Sequence of Events during a Visit
7. Statement from a Viet Cong Directive
8. What the AGILE COIN Game Is and Is Not
9. Timing Graph
10. Map of the Area
11. Rules for Government Administrators (Government folder only)
12. Chips representing forces: Government, 175-250 for 3 to 7 villages; Insurgents, 50-75 for 3 to 7 villages. These force sizes must be kept secret.

Village folders should contain:

1. Rules for Villagers
2. Procedures for Villages with more than one Player

3. Suggestions
4. Critique forms
5. Message forms
6. Sequence of Events during a Visit
7. Statement from a Viet Cong Directive
8. What the AGILE COIN Game Is and Is Not
9. Timing Graph
10. Village Name Cards
11. Report forms, 15 for each player
12. Chips representing villagers: 100 per village divided equally among the players

The Control folder should contain:

1. Control record sheets
2. Casualty Calculator
3. Die (or Dice)
4. Bell
5. Briefing Outline
6. Win Criteria
7. Display Sheets
8. Complete Set of Rules

D. Briefing

The pre game briefing should be scheduled to last about one hour for first-time players. and should cover the following subjects:

1. Objects of the game and general conditions for winning
2. Censored rules for villagers
3. Move sequences and visit mechanics
4. General resource levels
5. Courier service, message pads, and inter-village communications
6. Delays in messages, intelligence and training
7. Bell
8. Engagements
9. Role of Administrators and Spies (Insurgent spies should be selected and notified secretly and informed that they can communicate by writing messages on the report form that will be delivered by Control)
10. Chips representing people
11. Village elections, role of the chief
12. Reports after every cycle
13. Abduction and voluntary departure from the village
14. Divide into 3 groups: Government, Insurgent and Villagers to continue with detailed briefings. Allow about 20 minutes for strategy formulation.

II. Game Operation

The game is played by the belligerents visiting the villages in alternate equal length time periods, with the Insurgents moving first. The time period is characteristically 10 minutes in length, but it can be adjusted

by the Control team to control game dynamics. It is desirable to get as many moves as possible into the time allotted and to avoid boredom on the part of all players if the action is slow and yet also to allow time for planning and Control functions, if the action is fast.

The Control team is responsible for:

1. Player's following the rules
2. Handling the chips for visits and engagements
3. Collecting reports
4. Maintaining displays and records
5. Situation-specific decision-making
6. Signifying winner when necessary

III. Post-Game Analysis

A. The De-Briefing Session

Immediately after the game is stopped (because either the time has run out or the win criteria have been met), a de-briefing session should be held with discussion structured in the following sequence:

1. Control's summary of the overall play and presentation of loyalty and population profiles
2. Presentation of Government strategy and play
3. Presentation of Insurgent strategy and play
4. Report on village play from each chief
5. Discussion including descriptions by the village players of their perceptions, strategy and concepts of loyalty as reported during the game

B. Analysis of the Game

After the game, the Control team should write a brief descriptive summary of the game. This general description should be combined with actual control records of the game, villager report forms, and all written messages to enable analysts to reconstruct the game. The attached village analysis form has been found useful for this purpose. The Comments section should focus on what affects loyalty, particularly the events leading up to loyalty changes. Reasons given on the back of the villager report forms for loyalty shifts are particularly useful for this. Correlations between "Loyalty", "Who do you think is winning", "Who do you want to win", and "How much longer will the game last" are useful to observe the cross-pressures felt by the villagers. Other factors bearing on loyalty are frequency of belligerent visits and size of the visiting force, village population level and the causes of its decline, the presence of a Government administrator, ambush placement, and military engagement outcomes.

The reconstruction and analysis of the game usually require about one hour per village and are, therefore, not usually available until the day after the game. However, learning outcomes can be considerably improved by a discussion of the game analysis on the following day since until this time, no single player has had an overview of the complete game.

VILLAGE _____

Cycle	1	2	3	4	5	6	7	8	9	10
Number I / Visiting G										
Group										
Population										
Loyalty G, N, I										
Who is Winning										
Winner Preference										
Expected Game Length (Cycle)										
No. Recruited										
No. Impressed										
No. Killed										
Who and how many in Ambush										
Ambush Outcome (all casualties) G I V										
Administrator?										

COMMENTS :

POST-GAME ANALYSIS FORM

A COMPLETE SET OF GAME MATERIALS

RULES FOR BELLICERENTS

GAME OBJECTIVE

To observe the effects of coercion and counter-coercion on village loyalty using terror, impressment, recruitment, and protection.

TEAMS

There are three types of teams in the game: Two belligerents, Insurgents, Government; and the Villages (population). There is only one Government and one Insurgent team; but there are several Village teams.

PLAYER OBJECTIVES (Definitions of Winning)

Insurgents -- Gain the loyalty of villages and increase forces.

Government -- Gain the loyalty of villages and decrease insurgent forces.

Villages -- Survival and ending of conflict as soon as possible. The winning village is loyal to the winning side at the time of victory and has incurred the least population loss.

There are 2 winners: the successful belligerent and the winning villager. The exact criteria (predetermined) for winning the game by either belligerent are known only to Control.

MOVE RATES

Government and Insurgents are given alternate periods for action (to simulate days and nights). These alternate periods are normally ten minutes long. If the belligerents exceed the pre-set move time, they lose 10% of their remaining forces per minute (to simulate Government forces being caught at night, or Insurgent forces being caught out during daylight). Move limits are signified by bell ringing: 1 = night; 2 = day.

RESOURCES

Insurgent forces are represented by symbols (coins, chips, or cards). Their size is known only to their leader (and Control), but ranges from 20 to 200. Initial Government force equals 200 men. Government forces are also represented by symbols. Each village starts with 100 villagers including a chief; they are represented by symbols.

MILITARY

1. Ambush (surprise) increases force effectiveness, but a betrayed ambush reduces force effectiveness according to casualty tables maintained by Control.

2. The numerically superior force (in effective units) always wins. No prisoners are taken, and forces are killed in proportion to numbers and force ratios (indicative of length of battle).

3. Both Insurgent and Government can recruit by persuasion or impressment from villages, but villages can respond by shifting loyalties, giving intelligence to the adversary, or in some cases, violently resisting.

4. Any player (villager or belligerent) can kill with a sufficient force superiority.

5. Villages can fight at an effectiveness of 1 to 5 against either Government or Insurgents or both. Example: 50 Villagers can kill 9 belligerents.

6. Whenever there is any kind of military action in a village, some villagers are killed in the crossfire in proportion to the size of the military action.

7. Large ambushes are more likely to be detected by the adversary. Ambushes of less than 10 are not detected (unless betrayed). Control will judge whether or not a large ambush is detected, based on probabilistic criteria. If it is considered detected, Control will warn the intended victim of the ambush.

8. Number of Government casualties is known to Insurgent winning an engagement; the converse is not true.

INTELLIGENCE

The Government team is provided with a special display of information for each village, if an administrator is alive in the village. The display of village loyalties and populations is reported by the chief and delayed one game cycle. The belligerents also have courier services to carry messages. Intelligence is gained more routinely by villagers and belligerents by face-to-face interrogation.

ATTRITION FROM DESERTIONS

One percent each of belligerent forces desert each move, with an 0.5 probability of returning to a village

DEPLOYMENTS

The Government must keep at least 10% of its force at home (the capital) of which 1/2 may be recruits. Failure to comply will result in Control's penalizing severely. Home base can be attacked by Insurgents to inflict losses and gain current loyalty and population information displayed. This attack can occur at any time - even during the Government move - by the Insurgents visiting Government headquarters in the presence of a Control person. Forces are engaged at 1:1 effectiveness.

Each belligerent must deposit with Control the symbols representing the size of his visiting force at each village. These symbols are returned to him at the end of the move--not at the end of each village visit. He cannot move his entire force from village to village in a single move. Visiting Government forces must always be at least 2 soldiers, but Insurgents may visit singly.

RULES FOR ACTION

1. There is no limit to the number of villages that can be visited in each time period by either belligerent, except the lack of visiting forces and the decision for a reconnaissance visit in force (see No. 7).

2. There is an impressment ratio of 1 villager: 3 impressors and a delay before use of impressed villagers because of the requirements for training. Impressed villagers can then be forced to fight along with the belligerents if they are accompanied by an equal number of belligerents. Example: 27 Insurgents can impress 9 villagers. These villagers are in training during the next move of the impressor and cannot be used by him. However, at the beginning of his second move after impressment, 9 Insurgents can fight side-by-side with the 9 impressed villagers making a force of 18.

3. Villagers that have been impressed or recruited may be returned by the belligerents to their home villages at the discretion of the impressor, subject to losses.

4. A Government administrator (unarmed, but taken from the initial Government force of 200) may be left in each village to give information or warning. If there is a Government ambush in a village, villagers may not kill the administrator without killing the entire ambush.

5. The Government cannot set ambushes for Insurgents until Insurgents take some action in the villages (impressment, recruitment, or killing).

6. A visit by Government or Insurgent to a village is made in the following sequence:

a. Control and a belligerent (physically) approach a village position.

b. During this approach the villager or administrator may warn the belligerent of an ambush verbally or by holding up a written card so indicating.

c. The belligerent gives the symbols showing the number in his visiting force to Control.

d. Control tells the villager the approximate size of the visiting force (small, medium, large).

e. If there is an ambush, the superior force wins. A belligerent cannot speak to the villager if he loses due to the ambush, or if the villager decided to fight the visiting force and wins.

f. Belligerents can gather intelligence through discussion with personnel in the village, or take action in the village, only if they have made a successful entry.

7. Either belligerent may make special reconnaissance visits to gain information about a suspected ambush in a village by informing control and the village chief of his intention. Control will then reveal the true ambush status of that village. If there is an ambush present the belligerent may then use this information as adequate warning upon his return to that village on his next move. Only that one village may be visited on each of these consecutive moves.

RECORD KEEPING

Villages record loyalty and village population after every cycle. Reasons must be listed for changes in loyalty values. Loyalties are shown as "G" (Government), "I" (Insurgents), or "N" (Neutral). Major discrepancies between voluntary actions and stated loyalties are subject to negotiation with Control at the end of the game. Loyalty changes must go through neutral for one cycle when changing sides.

Intelligence estimate forms may be kept to aid village planning.

COURIER SERVICES

A Government and an Insurgent courier carry written messages between their headquarters and villages. They may also be used to exchange messages between villages.

*****

Impressed men cannot all be returned to villages. The actual number returned will be the product of the desired number to be returned and a roll of a die (i.e., 60% return if die turns up 6).

Counter-Ambushes must be based on positive intelligence of the presence of an ambush in a given village, and this intelligence must be declared to Control first. The village host to an ambush may elect to betray the counter-ambush by "warning" the ambush it is host to. The village does this by private declaration to Control at the approach of the counter-ambush forces. In the event of a betrayed counter-ambush of a betrayed ambush, all forces fight at actual numerical values since surprise is lost on both sides.

Villages cannot engage in ambushes or counter-ambushes. They can only act militarily at one-fifth effectiveness

Villages know only the approximate size of approaching counter-ambushing forces (large, medium, or small).

If village warns of ambush smaller than actually present, or if a general warning (unspecified betrayal) is given, forces fight at 1:1 force effectiveness.

Time Out may be called from time to time by Control as required.

ABDUCTION RULES

Belligerents may abduct and release individual village players. Players in custody must be taken to belligerent headquarters and guarded by a belligerent team member. The village player's population is under the control of the village chief while he is away. If he returns, he resumes control of his villagers.

When trainees are returned to the villages, their fighting effectiveness is increased from 1:5 to 1:2 and it may be used against either belligerent.

Insurgent spies may be present.

RULES FOR GOVERNMENT ADMINISTRATORS

1. You are the government administrator in a village. Your loyalty is to the government and you will always tell the government the truth, answering any questions asked of you by the government; also volunteering any information you think would be helpful to the government. You are an information storage device, accessible only to the government. You may lie or refuse to speak to the insurgents or the village chief.

2. You are, while you're alive, also the communications link to the government. As such, you send notes through the government courier service when you or the village chief have information to pass on to the government, or to answer government notes. Further, if you know of an ambush in your village or another village, you may warn an approaching government team of this fact by stepping into warning area (after government approaches) and telling government.

3. You wish to aid the government in gathering information and gaining loyalty. You will therefore:

   a. Try to ascertain what the loyalty of your assigned village is. The information on the sheet the chief hands to control will not be received by the government until one cycle later--if you can find out the information sooner, the government will be helped.

   b. Try to influence the village chief in the village to which you are assigned to become pro-government. Persuasion, lies, threats, all are possible, allowable ways of influencing. However, if you become sufficiently obnoxious, the villagers may decide to assassinate you. Any persuasive action on your part must be done on orders from the government--not initiated by you.

4. There is an excellent chance that at some point in the game, you will be killed. There are several ways in which this can happen:

   a. The insurgents may kill you, with or without the consent of the village. If the village at which you are stationed does not choose to defend you, you may be slain by a single visiting insurgent. If, on the other hand, the village wishes to defend you, the insurgents will need a force.

   b. The village may kill you at any time, by informing you that you are dead. (If there is no government ambush in the village.)

When killed, you may not inform the government which of the two options was used to kill you and you must leave the village immediately.

RULES FOR ADMINISTRATORS

5. In the event that you are killed, you will go the administrator queue at Government Headquarters. New administrators will be taken from the queue (on a first-in-first-out basis) as needed by government, and distributed to villages as the government desires. While in the queue, the administrators are dead and in limbo, waiting to return in their next reincarnation as administrator of some village or other. While in the queue no information concerning the game should be exchanged, and little talking should be conducted.

6. When an administrator is taken from the queue and assigned to a village, he may freely relate only that information (or pro-government falsehoods) to the village chief that he has been given or perceived since being "re-incarnated."

AGILE-COIN GAME

RULES FOR VILLAGERS

GAME OBJECTIVE

To observe the effects of coercion and counter-coercion on village loyalty using terror, impressment, recruitment, and protection.

TEAMS

There are three types of teams in the game: Two belligerents, Insurgents, Government; and the Villages (population). There is only one Government and one Insurgent team; but there are several Village teams.

PLAYER OBJECTIVES (Definition of Winning)

Insurgents -- Gain the loyalty of villages and increase forces

Government -- Gain the loyalty of villages and decrease insurgent forces.

Villages -- Minimize losses, ending the conflict as soon as possible, and be on the winning side at the end of the game.

There are 2 winners: the successful belligerent and the winning village. The exact criteria (predetermined) for winning the game by either belligerent are known only to Control.

MOVE RATES

Move limits are signified by bell ringing: 1 = night (Insurgent move begins); 2 = day (Government move begins).

RESOURCES

Belligerent forces and village populations are represented by symbols (coins, chips, or cards).

MILITARY

1. Ambush (surprise) increases force effectiveness, but a betrayed ambush reduces the force to an effective number of some fraction of its size (to simulate counter-ambush).

2. The numerically superior force (in effective units) always wins.

3. Both Insurgent and Government can recruit by persuasion or Impressment from villages, but villages can respond by shifting loyalties, giving intelligence to the adversary, or in some cases, violently resisting.

4. Any player (villager or belligerent) can kill with a sufficient force superiority.

5. Villages can fight against either Government or Insurgents or both.

6. Crossfire.

7. Large ambushes are more likely to be detected by the adversary. Control will judge whether or not a large ambush is detected, based on probabilistic criteria. If it is considered detected, Control will warn the intended victim of the ambush.

INTELLIGENCE

The Government team is provided with a special display of information for each village, if an administrator is alive in the village. The belligerents have courier services to carry messages. Intelligence is gained more routinely by villagers and belligerents by face-to-face interrogation.

RULES FOR ACTION

1. Impressed villagers can be forced to fight along with the belligerents if they are accompanied by an equal number of belligerents.

2. A Government administrator (unarmed, but taken from the initial Government force) may be left in each village to give information or warning. If there is a Government ambush in a village, villagers may not kill the administrator without killing the entire ambush.

3. A visit by Government or Insurgent to a village is made in the following sequence:

   a. Control and a belligerent (physically) approach a village position.

   b. During this approach the villager or administrator in warning area may warn the belligerent of an ambush verbally or by holding up a written card so indicating.

   c. Control tells the villager the approximate size of the visiting force (small, medium, large).

   d. If there is an ambush, a belligerent cannot speak to the villager if he loses due to the ambush, or if the villager decides to fight the visiting force and wins.

RECORD KEEPING

Villages record loyalty and village population after every cycle. Reasons must be listed for changes in loyalty values. Loyalties are shown as "G" (Government), "I" (Insurgents), or "N" (neutral). Major discrepancies between voluntary actions and stated loyalties are subject to negotiation with Control at the end of the game. Loyalty changes must go through neutral for one cycle when changing sides.

Intelligence estimate forms may be kept to aid village planning.

COURIER SERVICES

A Government and an Insurgent courier carry written messages between their headquarters and villages. They may also be used to exchange messages between villages.

* * *

Counter-Ambushes must be based on positive intelligence of the presence of an ambush in a given village, and this intelligence must be declared to Control first. The village host to an ambush may elect to betray the counter-ambush by "warning" the ambush it is host to. The village does this by private declaration to Control at the approach of the counter-ambush forces.

Villages cannot engage in ambushes or counter-ambushes. They can only act militarily at effectiveness against belligerents entering their village when no adversary belligerent forces are present.

Villages know only the approximate size of approaching counter-ambushing forces (large, medium, or small).

Time out may be called from time to time by Control as required.

Insurgent spies may be present.

Procedures for Villages with more than One Player

Each village player represents the leader of an extended family in the village. At the beginning of the game the village population (represented by symbols) is divided equally among the players.

The village chief is elected by majority vote. Each player has as many votes as the population of the group he represents, and elections may be held at any time. The chief decides and reports overall village loyalty (G, N, or I) to control written on the report forms at the end of each move cycle. If there was a Government administrator present during the entire move cycle, the Government is given this information with a one cycle delay. The chief decides the number recruited from each player by either belligerent unless overruled by the belligerent. Unless specified by the belligerent, villagers impressed are taken in proportion to the population held by each player.

Village players may make their own decisions (not necessarily the same as the chief) about the military actions of their group (to fight or not to fight).

Each player must report his identification, population, and loyalty to control (secretly, on the form provided) at the end of each move cycle. Only the chief's reporting of overall village loyalty is subject to delayed review by the Government as described above.

Village players may spy for either side. Communications with belligerents are by discussions during visits or by notes written on the cards provided and delivered to the couriers.

Village players may leave the village and join the forces of the Insurgent (as cadre) or the Government (as soldiers). There will be a short (1 cycle) training period before they can be used in combat. They may return to their villages with the consent of the joined belligerent but can expect to suffer losses on the trip due to the perils of the jungles. If consent is not granted, they can be forced to fight as impressed villagers.

Each player should keep a record of events and impressions. Reasons for loyalty shifts are particularly important.

VILLAGER REPORT FORM

Village_____Faction_____Cycle_____

Loyalty: (Check One)
Insurgent_____
Neutral_____
Government_____

State reasons for loyalty shifts on back

Your population (# of villagers)_____

Your man-losses due to impressment this cycle_____

Was there a village administrator in your village all during this cycle?_____

Are you the Village Chief?_____
If YES, give your estimation of the loyalties of the rest of your village_____

_____

Who do you think is winning?_____

Who do you want to win?_____

How much longer (# of moves) will the game last?_____

State any criticism of players' actions and/or game rules on the back of this sheet.

NAME_____

SEQUENCE OF EVENTS DURING VISIT

1. Belligerent approaches village.

2. Control consults probability of detection table for ambush warning, gives approaching belligerent warning if table so indicates. (If applicable because of large size of ambush.)

3. Villagers or the administrator may warn of ambush (and its size, if desired).

   a. If there is an ambush in the village, and village chief reports less men than actually present, engagement fought at 1:1 force ratios.

   b. If there is an ambush in the village, and the village chief reports the correct or greater number of men to the approaching belligerent, the visiting forces fight as a counter-ambush.

   c. Or they may give other warnings (false, ambiguous, etc.) or warnings about the other villages.

4. Belligerent decides whether to visit village and, if so, the size of the visiting force. Visiting force is handed to Control, and the belligerent declares whether his visit is a counterambush force(which, if control accepts his evidence, results in surprise advantages for belligerent).

5. Control communicates the approximate size of visiting force to the village (small, medium, or large).

6. Villages may respond by:

   a. No action.

   b. Fighting belligerent visitors, if no ambush present.

   c. Warning ambush force in village of approaching counterambushing force, resulting in 1:1 force ratio conflict.

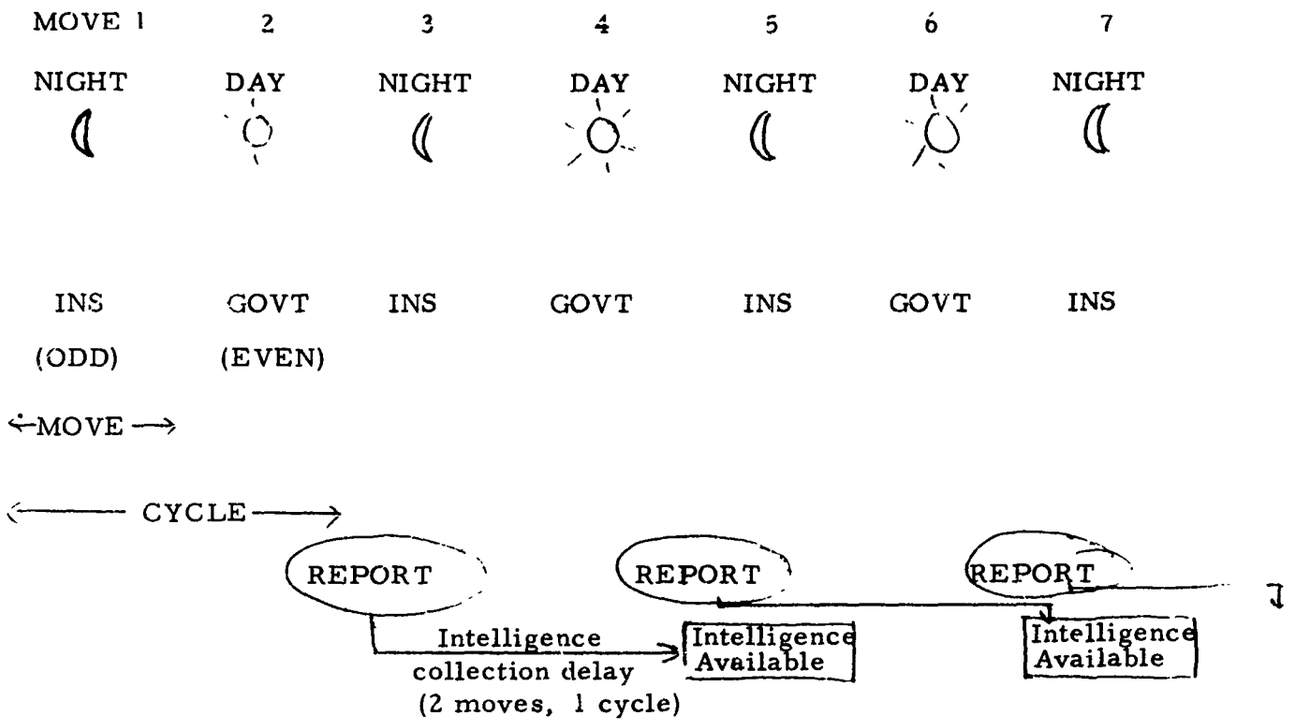
7. Control calculates and announces results of engagements if any, any communication desired, etc..

SEQUENCE OF EVENTS DURING VISIT

Definition:

ENGAGEMENT is the presence of both belligerents' forces in the same village.

An engagement may also occur between village and belligerent, but village may not participate in battle between belligerents. The presence of an administrator in village with visiting insurgents is not an engagement (i.e., not automatic). Executions are not engagements.



TIMING

*Intelligence (chief's assessment of village loyalty and population) available to Government if Administrator present--otherwise not.

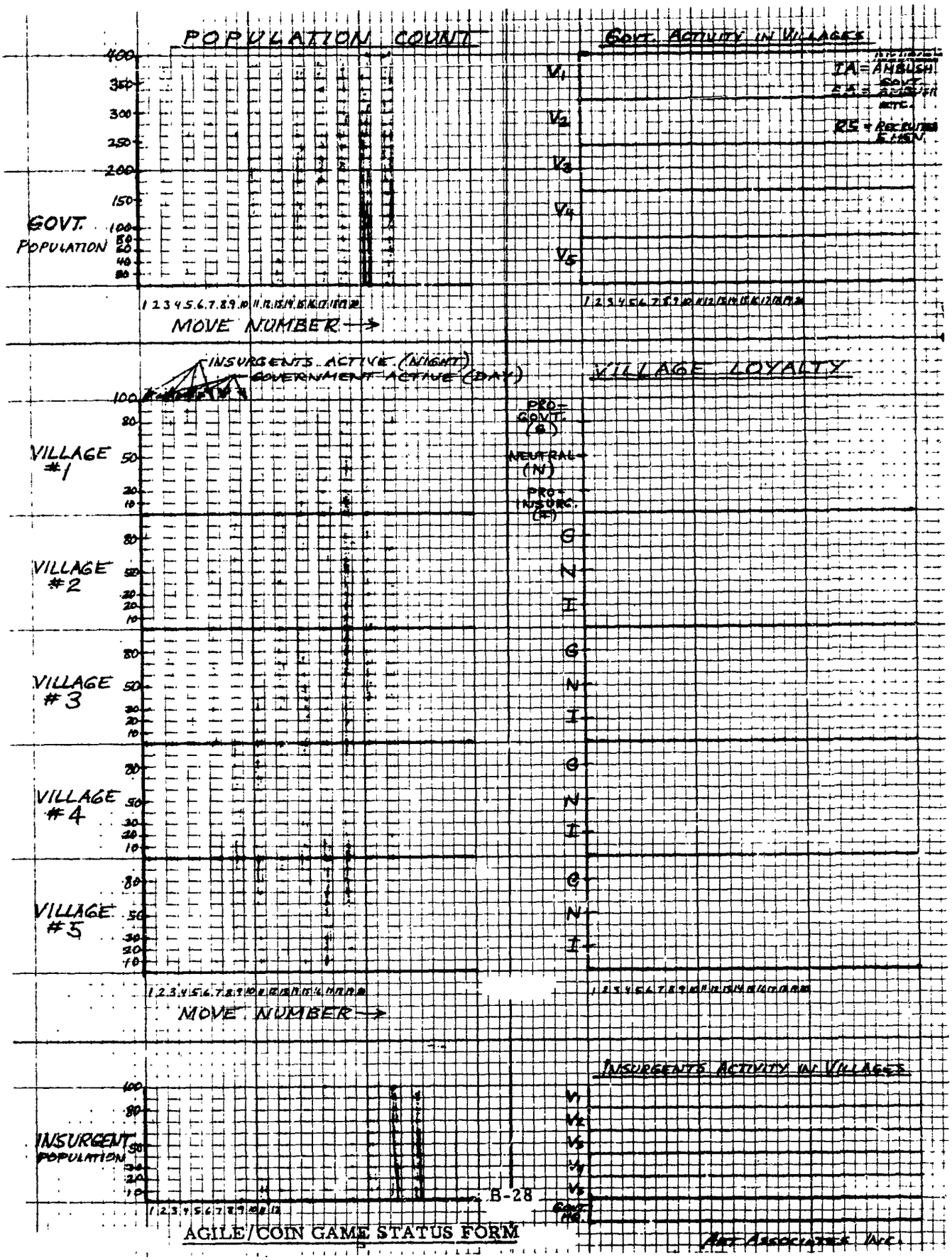
WINNING CRITERIA

A. Government
   1. Loyalty of a majority in every village
   2. No insurgent loyalty in a majority of villages
   3. Insurgents reduced to less than half original force

B. Insurgents
   1. Majority of villages loyal (plurality role in each loyal village)
   2. Minority loyalty in all other villages
   3. Destroy 20% of government forces, increase own 20%

C. Individual Villager
   1. In winning village
   2. Loyal to faction which is winning
   3. Largest % of original population of all those fitting C1 and C2 above

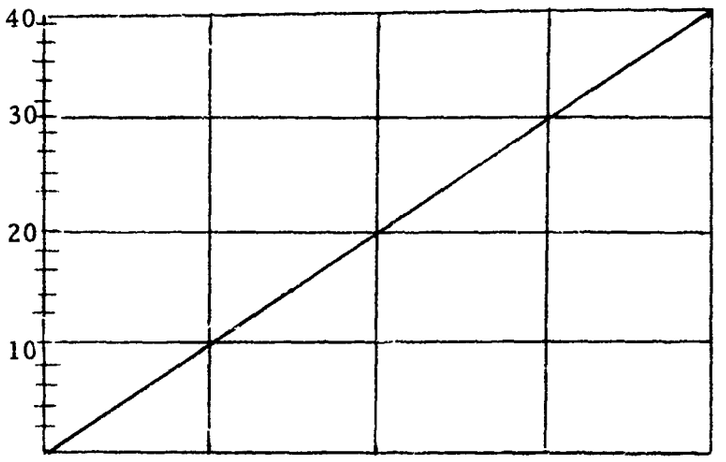
D. Individual Village
   1. Loyal to winning belligerent
   2. More men than any other village



AGILE/COIN GAME STATUS FORM

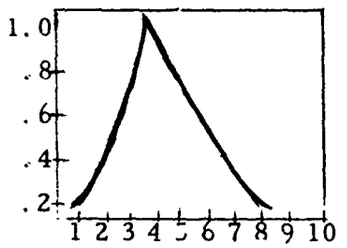
Abt Associates Inc.

CASUALTY CALCULATOR



Potential Villagers Killed (no surprise)

Total Number of Men Firing



Surprise Factor

Ratio, Surprised/Surprising

Village Casualties

If surprise is involved, casualties are the product of Potential Villager Killed and the Surprise Factor.

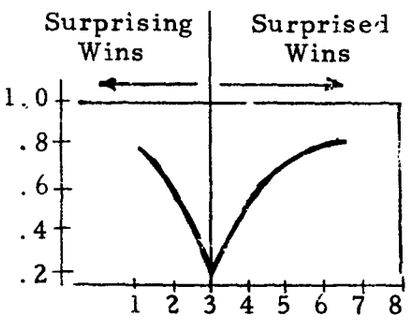
Belligerent Casualties

No Surprise:

$$\text{Larger Force Losses} = \frac{(\text{smaller force size})^2}{\text{larger force size}}$$

Smaller Force Losses = 90%

If Surprise,



Fraction Winner's Force Surviving

Ratio, Surprised/Surprising

Loser Casualties = 90%

WHAT THE AGILE COIN GAME

IS	and	IS NOT
A human player simulation of a few of the important local factors in the transition from subversion to guerrilla warfare.		A comprehensive simulation of all aspects of insurgencies in general, or of a particular insurgency.
A simulation of the interaction of political loyalties, military forces, and intelligence about loyalties and forces.		A simulation of the detailed tactics of counterinsurgency warfare or political subversion.
A simulation of a small number of small village communities responding alternatively to government and insurgent presence and demands.		A simulation of an entire country, or of the capital city of a country.
A simulation of coercion and counter-coercion using terror (threats of and simulated murder and abduction), impressment, recruiting, and protection.		A simulation of economic and ideological pressures and promises used to influence village populations.
A simulation of a few of the political responses to terror in the villages.		A simulation of the complete political process in villages.
Group training with maximum student participation (learning by doing).		A predictive technique for determining the real world outcome of certain combinations of variables and strategies.

From a Viet Cong Directive of September 1963:

"We should promote a comprehensive movement of political and military struggle (gain popular loyalty); carry out a continuous offensive to reduce enemy forces; build up our own forces;..... counteract the enemy's schemes which aim at separating the masses from the revolution; sabotage strategic hamlets;...oppose military operations; fight enemy commandoes and spies; strengthen the people; cooperate with the people to defeat the enemy..."

Quoted by Douglas Pike in "The Communication Proces of the Communist Apparatus in South Vietnam"

(UNDERLINED behavior is played in AGILE-COIN)

AGILE COIN GAME

CRITIQUE

1. What role did you play in the game?
2. What aspect did you find most realistic?
3. What aspect did you find most un-realistic?
4. What was your best move?
5. What was your worst error?
6. What would have been your best strategy?
7. Did you become deeply involved in the action?
8. Do you think the game was too short, about right, or too long? (circle one)
9. Do you think the game was too complex, about right, or too simple? (circle one)
10. Do you think the teams had too few, about the right number, or too many players? (circle one)
11. How many times should a soldier play the game to exhaust its training possibilities? Once? Three times? Ten times? Thirty times? (circle one)
12. What did you find most confusing about the game?
13. Who would learn most from playing this game?
14. What could be learned from observing many plays of the game?
15. How does the game compare with other training techniques?
16. How does the game compare with other research techniques?
17. Please write any suggested improvements on back of sheet. Thank you.

_____
Name

_____
Telephone No.

AGILE-COIN GAME

Some suggestions for the players derived from game critiques.

GOVERNMENT

Build up security in a few key villages and couple this with aggressive acts in the others.

Punish quickly those villages which are changing loyalty toward the insurgents.

Aggressive action pays off.

Record a plan of attack and communicate this to the villages.

Use the villages as information sources by asking questions about insurgent policies, and maintain a record of administration losses.

Play on motive of pavoff to villager. Villager can have no losses of people, but if on losing side, he still loses.

Impress equally to provide a large mobile force to maintain loyalty.

Avoid role playing--it wastes time and bores villagers.

Communicate your plan and other information (true or false) that will win village loyalty.

Ask about number of villagers and administrator, insurgent visits, neighboring villages.

Avoid the trap of trying too hard in the early stages instead of planning a long range strategy, and developing information channels. Don't get into a position of hoping the insurgents will run into an ambush rather than taking positive measures to punish villages that warn of ambushes.

GENERAL

To a large extent the dynamics of the game are determined by the Insurgents' general strategy. Government will usually wind up in trouble unless it correctly perceives the nature of Insurgent's strategy and counters that strategy directly.

AGILE-COIN GAME

Some suggestions for the players derived from game critiques.

INSURGENT

Send one man into each village from time to time on scouting -- if government ambush is present, you will learn of it at low cost.

Information is all important. Try to establish an information center by rewarding and punishing villages.

Determine whether intelligence is accurate or not by testing.

Act only with careful judgment, but then be decisive.

Appeal to a group of villages for their loyalty and a significant number of men, and pledge their return (force villagers into collusion so that they cannot act independently without causing confusion and distrust).

GENERAL

To a large extent the dynamics of the game are determined by the Government's general strategy. Insurgents will usually wind up in trouble unless they correctly perceive the nature of Government's strategy and counter that strategy directly.

AGILE-COIN GAME

Some suggestions for the players derived from game critiques.

VILLAGES

Avoid being drawn into forcing a win at great sacrifice.

Remember that a dead administrator allows freedom in loyalty position, but such freedom may require lying to government.

Test both sides' willingness to act, impress, etc., by false (made up) information.

When government plays a passive strategy, village can take a high risk position in helping insurgents.

Prepare notes to both sides ahead of time to speed up communication. Notes prevent eavesdropping.

Be careful to space information about other villages so that betrayal won't be so obvious.

Avoid having troops left in ambush and avoid impressment without reward. It is hard to get the troops out once they are positioned.

APPENDIX C

THE SIMULATION FLOW CHARTS

APPENDIX C

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1.0 Introduction

The purpose of this document is to present the detailed logical structure of the computer simulation model of the AGILE COIN game.

The entire model design has been oriented toward a computer simulation which will permit continuous, on-line man-machine interaction. Such interaction pervades the entire model structure. It permits the human player(s) to control the course of the game by selectively replacing the computer's decision-making functions with on-line human decision-making. Recent developments in computer systems technology have enabled such innovations to become practicable. Time-sharing systems provide the means of achieving such goals.

The benefits of man-machine interaction in the decision-making phases of the simulation have been a primary consideration in formulating the decision logic of the model. The details of this decision logic are provided in the flow charts of Section 3 in this Appendix. In these charts, however, the man-machine interaction in decision-making is not explicitly indicated. Instead, the interaction is treated in a generalized fashion in Section 2; and the flow charts show only computer decision-making.

This method of presentation was chosen for two reasons. First, by indicating only one (machine) mode of decision-making, the flow charts can be significantly shortened and simplified. Second, the man-machine aspect is essentially the same for all the model's decision-making functions, even though the specific decisions may differ. For these reasons, the specific method of employing the alternative decision-making modes has not been indicated in the flow charts themselves.

The implementation of a computer simulation providing man-machine interaction would, of course, require the incorporation of the decision-making modes described in Section 2, with the detailed logical structure presented in Section 3.

2.0 Decision-Making Modes in the Computer Simulation Model

There are three types of teams in the simulation:

GOVERNMENT, INSURGENTS } BELLIGERENTS
VILLAGES

There are several villages, each of which may consist of multiple factions. Both belligerents and each faction in each village may be represented by either a man or the computer.

The simulation has been designed to permit all of these game roles to be played in three alternative modes of operation, which are assigned at the start of the game. (See sample assignment in Figure A1.) In one mode (machine) the computer automatically assumes all the decision-making functions of the role. In the other two modes (analyst and player) a man is involved in every decision required of the role. The generalized decision-making procedures relating these three modes is shown in Figure A2, and their distinguishing features are described below.

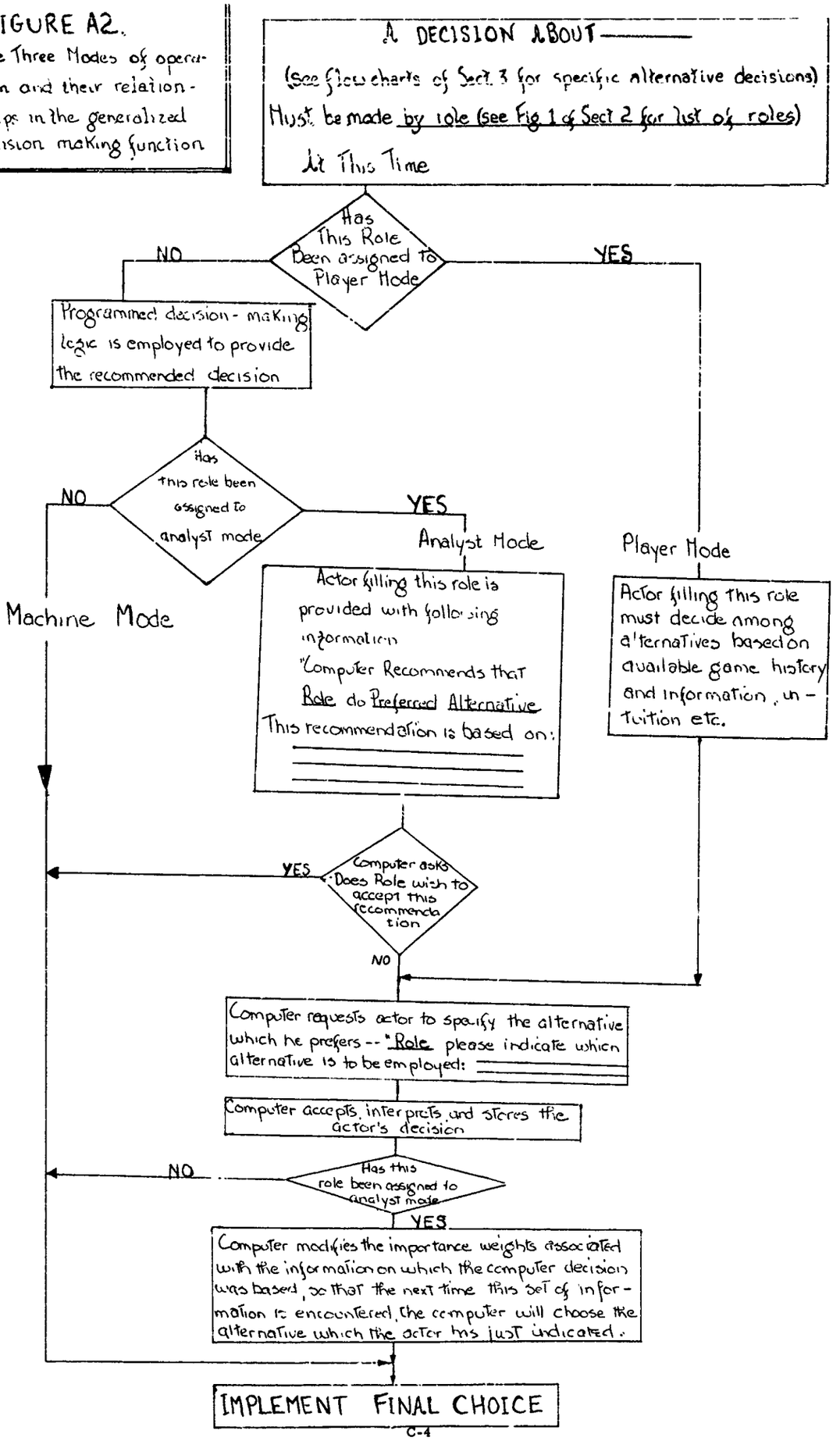
1. Machine - in this mode the entire decision-making logic is explicitly defined within the computer program and every decision required of this role is made automatically.
2. Analyst -- in this mode the man is provided with the computer-made decision, as well as all of the information used in reaching the decision. He is then allowed to change the decision if he so desires. Whenever he changes the computer-made decision, the importance (weight) associated with each piece of information (used by the computer in reaching its decision) is modified. The modifications are such that with the same pieces of information and the new weights the computer-made decision would be the same as the man-made one In this respect the simulation can be considered heuristic. Its decision-making functions undergo gradual modification in order to conform with the man's decision. Assuming that the man plays a rational game, the "true" decision-making functions will be gradually approached.
3. Player -- in this mode the man is provided only with the usual historical information available to that role in the manual game. He is then required to select a course of action from among the alternatives available to him.

ROLE	MODE		
	MACHINE	ANALYST	PLAYER
Government		X	
Insurgent			X
Village A:			
Faction 1	X		
Faction 2	X		
Faction 3		X	
Village B:			
Faction 1			X
Faction 2		X	
.			
.			
.			
.			

SAMPLE ROLE/MODE ASSIGNMENT TABLE
FOR AGILE/COIN COMPUTER SIMULATION

Figure A1

FIGURE A2.
The Three Modes of operation and their relationships in the generalized decision making function


A DECISION ABOUT ———
(See flow charts of Sect. 3 for specific alternative decisions)
Must be made by role (see Fig 1 of Sect 2 for list of roles)
At This Time
Has This Role Been assigned to Player Mode
NO
YES
Programmed decision-making logic is employed to provide the recommended decision
Has this role been assigned to analyst mode
NO
YES
Analyst Mode
Player Mode
Machine Mode
Actor filling this role is provided with following information
"Computer Recommends that Role do Preferred Alternative
This recommendation is based on:
Actor filling this role must decide among alternatives based on available game history and information, intuition etc.
Computer asks: Does Role wish to accept this recommendation
YES
NO
Computer requests actor to specify the alternative which he prefers -- "Role please indicate which alternative is to be employed:
Computer accepts, interprets, and stores the actor's decision
Has this role been assigned to analyst mode
NO
YES
Computer modifies the importance weights associated with the information on which the computer decision was based, so that the next time this set of information is encountered, the computer will choose the alternative which the actor has just indicated.
IMPLEMENT FINAL CHOICE

3.0 Descriptive Flow Charts

This section provides a variety of flow charts which indicate the types of interactions; basic sequence and gross decision-logic of each move cycle; and a set of detailed logical flow charts suitable for developing a prototype computer simulation of the AGILE/COIN game.

The gross interactions and the basic sequence and gross decision logic are directly applicable to a description of either the manual game or the computer simulation. The detailed charts have been prepared specifically for application to computer simulation. However, they are also applicable to the manual game, although in a restricted sense. They are applicable to the extent that they provide a player of the manual game with an explicit statement of factors which should be considered and actions which should be taken in playing the manual game. However, they are not applicable to the extent that detailed adherence to such flow charts in a manual game would consume an inordinate amount of time and, occasionally, may not conform with a human player's intuitively and spontaneously reached decisions.

3.1 Gross Interactions, Basic Sequence, and Gross Decision Logic

Each of the three teams,

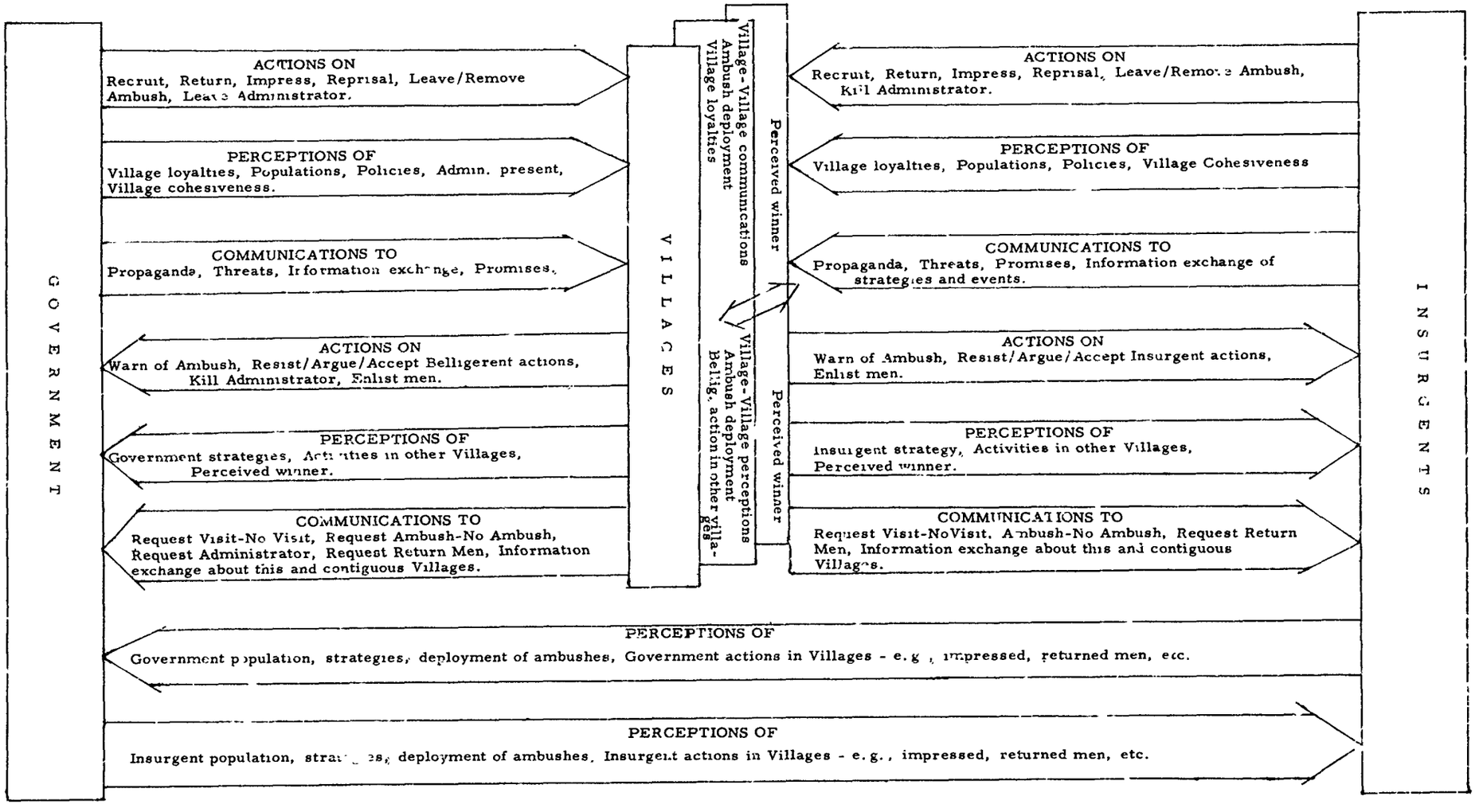
Government
Insurgent
Village

which interact in the manual game and the simulation, do so through a complex variety of

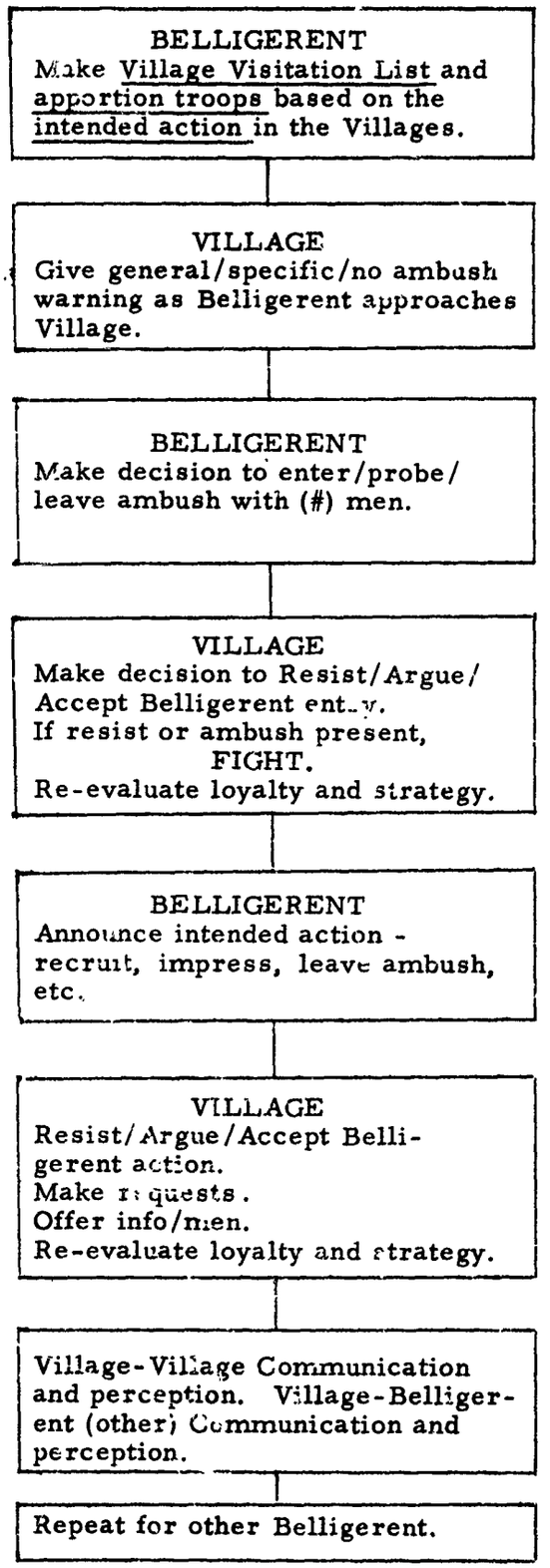
Actions
Perceptions
Communications

and the major features of these interactions are shown in the following pages, C-6 through C-11.

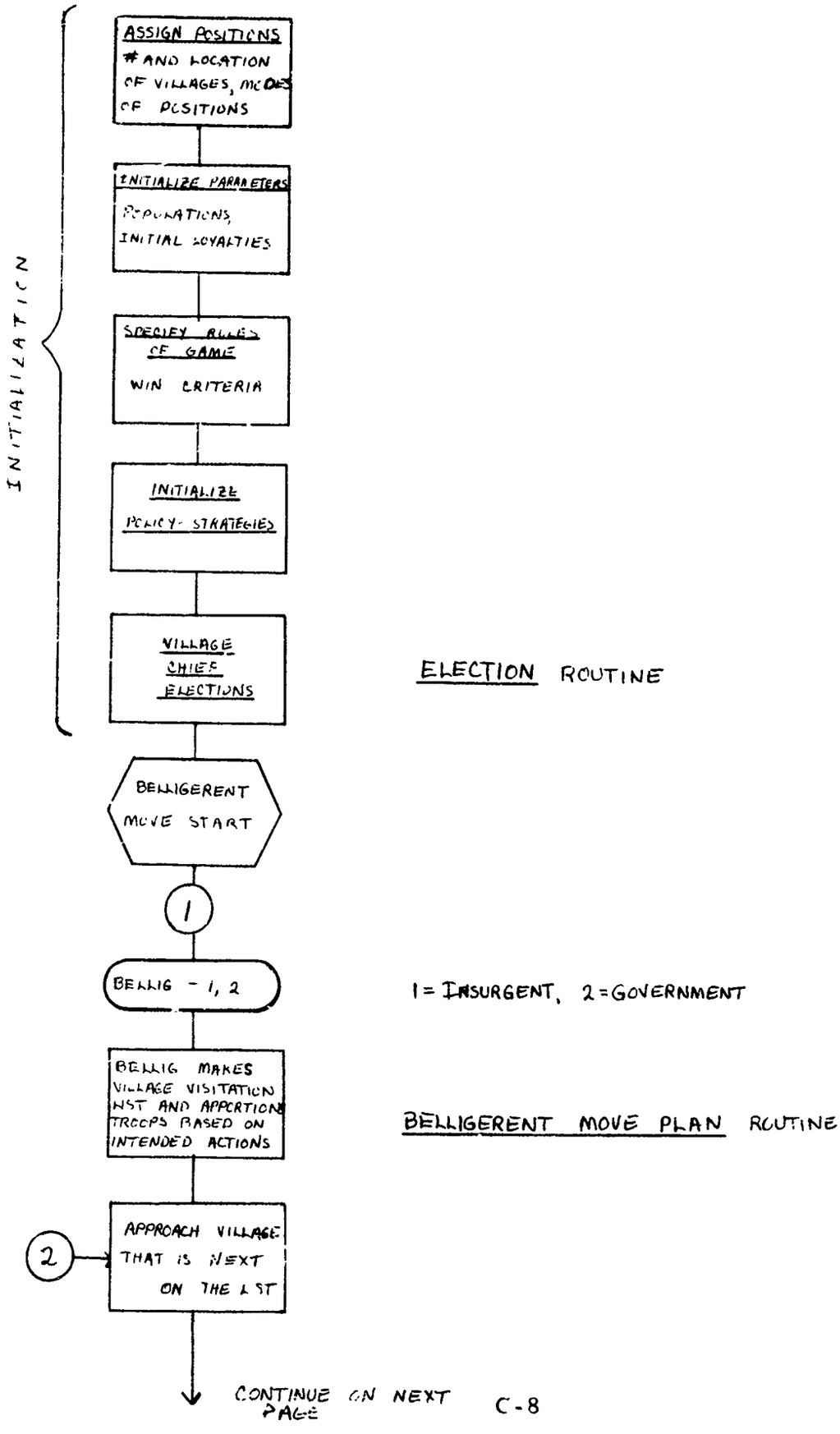
AGILE-COIN GROSS INTERACTIONS

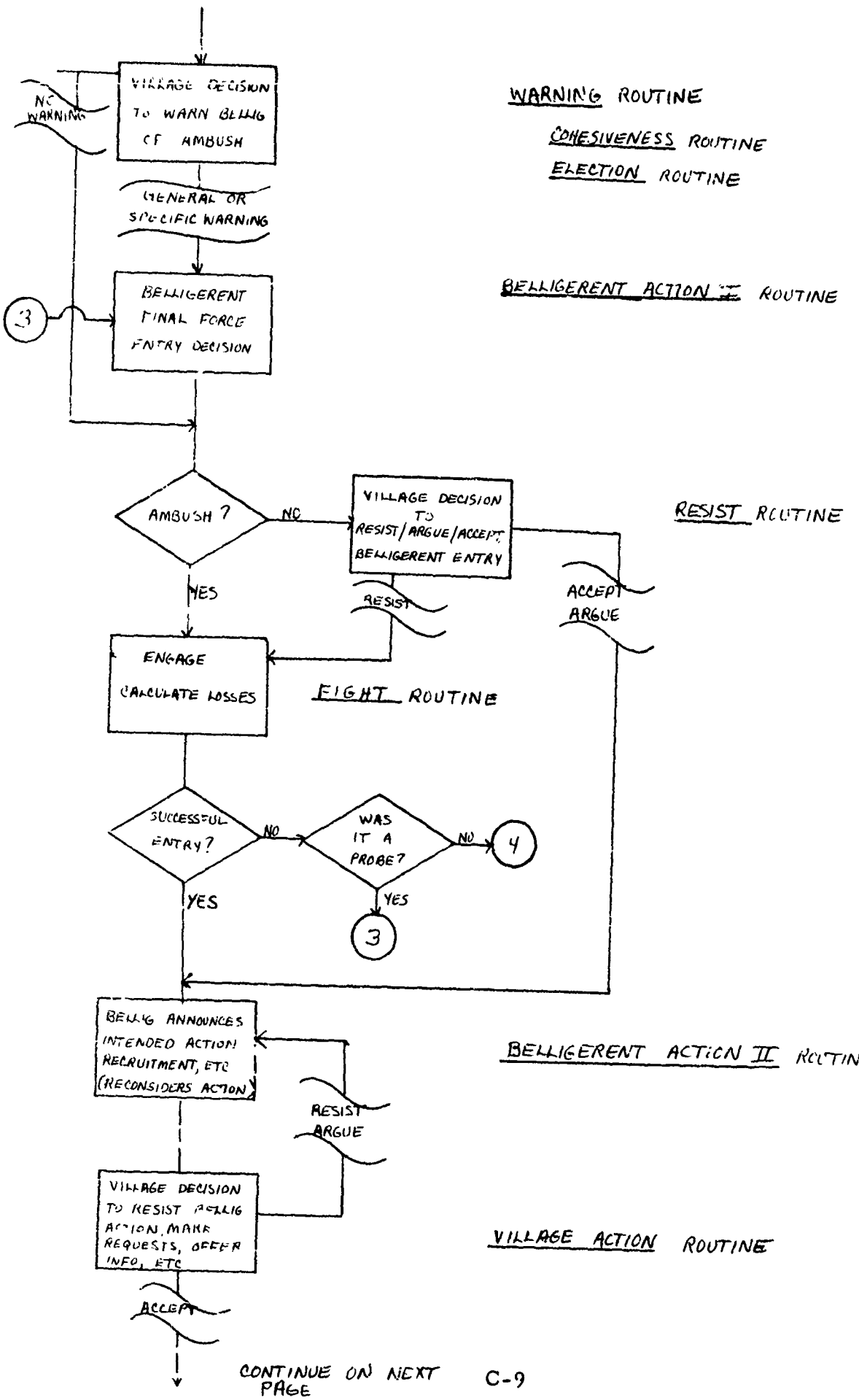

GOVERNMENT
VILLAGES
INSURGENTS
ACTIONS ON
Recruit, Return, Impress, Reprisal, Leave/Remove Ambush, Leave Administrator.
PERCEPTIONS OF
Village loyalties, Populations, Policies, Admin. present, Village cohesiveness.
COMMUNICATIONS TO
Propaganda, Threats, Information exchange, Promises.
ACTIONS ON
Warn of Ambush, Resist/Argue/Accept Belligerent actions, Kill Administrator, Enlist men.
PERCEPTIONS OF
Government strategies, Activities in other Villages, Perceived winner.
COMMUNICATIONS TO
Request Visit-No Visit, Request Ambush-No Ambush, Request Administrator, Request Return Men, Information exchange about this and contiguous Villages.
Village-Village communications
Ambush deployment
Village loyalties
Perceived winner
Village-Village perceptions
Ambush deployment
Belligerent action in other villages
Perceived winner
ACTIONS ON
Recruit, Return, Impress, Reprisal, Leave/Remove Ambush, Kill Administrator.
PERCEPTIONS OF
Village loyalties, Populations, Policies, Village Cohesiveness
COMMUNICATIONS TO
Propaganda, Threats, Promises, Information exchange of strategies and events.
ACTIONS ON
Warn of Ambush, Resist/Argue/Accept Insurgent actions, Enlist men.
PERCEPTIONS OF
Insurgent strategy, Activities in other Villages, Perceived winner.
COMMUNICATIONS TO
Request Visit-NoVisit, Ambush-No Ambush, Request Return Men, Information exchange about this and contiguous Villages.
PERCEPTIONS OF
Government population, strategies, deployment of ambushes, Government actions in Villages - e.g., impressed, returned men, etc.
PERCEPTIONS OF
Insurgent population, strategies, deployment of ambushes, Insurgent actions in Villages - e.g., impressed, returned men, etc.

BASIC MOVE SEQUENCE


BELLIGERENT
Make Village Visitation List and apportion troops based on the intended action in the Villages.
VILLAGE
Give general/specific/no ambush warning as Belligerent approaches Village.
BELLIGERENT
Make decision to enter/probe/ leave ambush with (#) men.
VILLAGE
Make decision to Resist/Argue/ Accept Belligerent entry.
If resist or ambush present, FIGHT.
Re-evaluate loyalty and strategy.
BELLIGERENT
Announce intended action - recruit, impress, leave ambush, etc.
VILLAGE
Resist/Argue/Accept Belligerent action.
Make requests.
Offer info/men.
Re-evaluate loyalty and strategy.
Village-Village Communication and perception. Village-Belligerent (other) Communication and perception.
Repeat for other Belligerent.

AGILE-COIN GROSS DECISION LOGIC





WARNING ROUTINE

COHESIVENESS ROUTINE

ELECTION ROUTINE

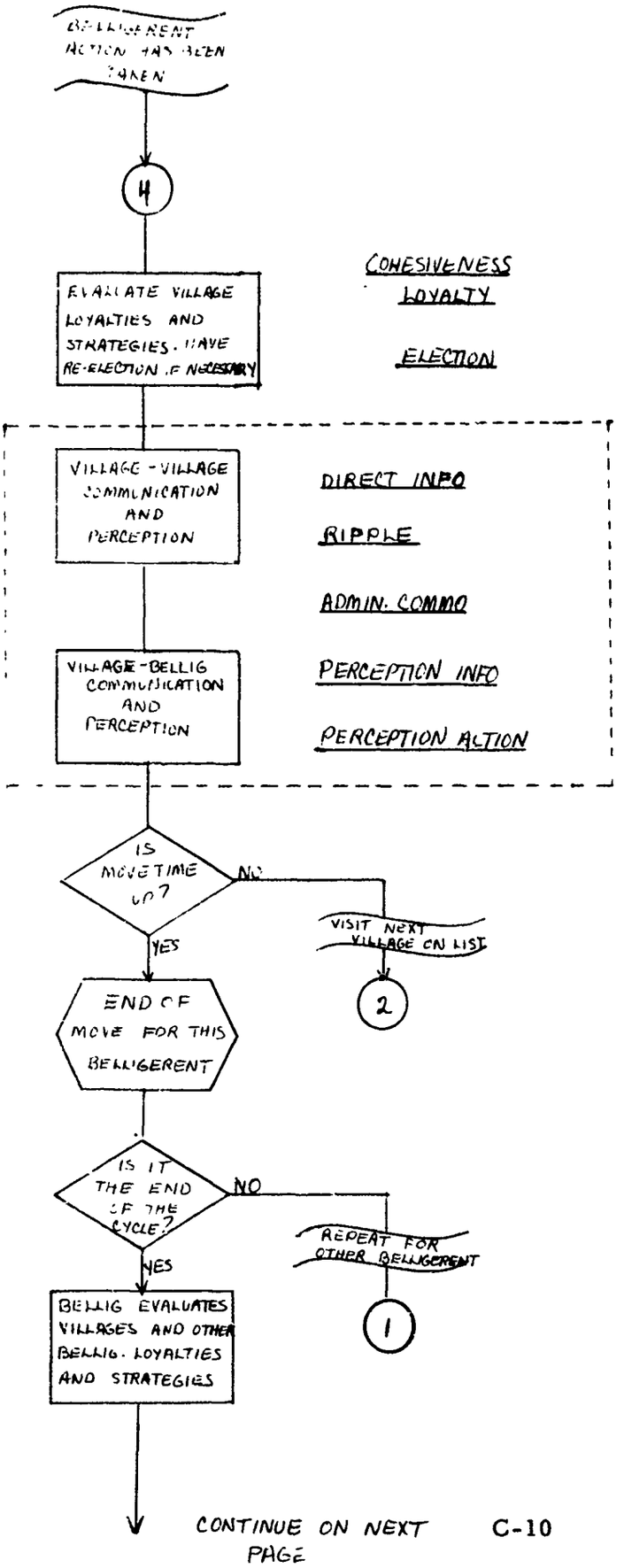
BELLIGERENT ACTION II ROUTINE

RESIST ROUTINE

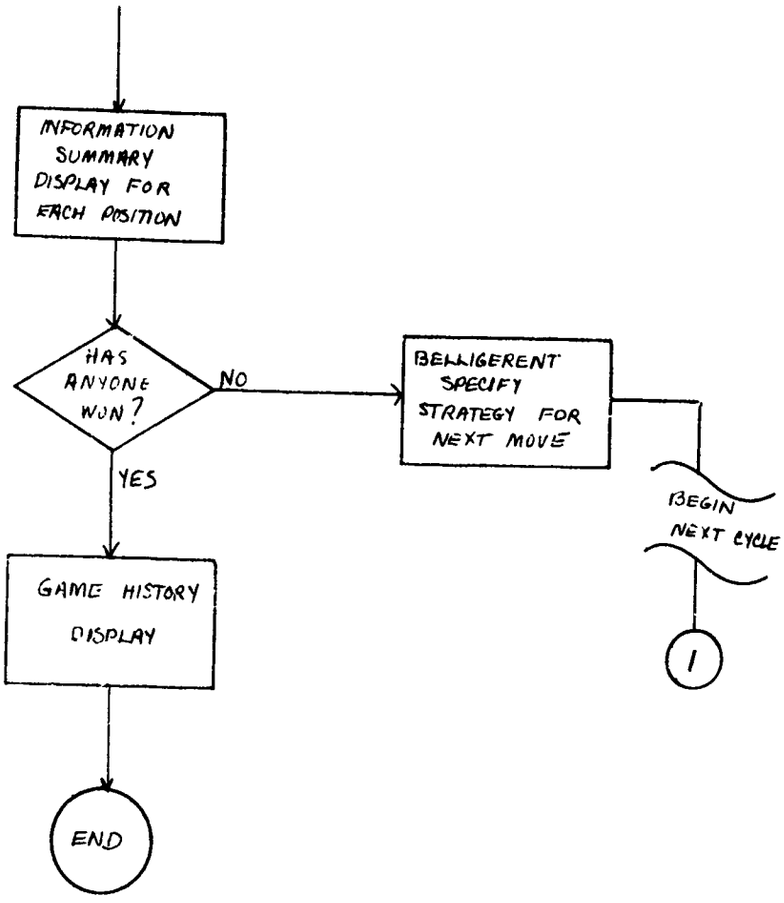
FIGHT ROUTINE

BELLIGERENT ACTION II ROUTINE

VILLAGE ACTION ROUTINE



CONTINUE ON NEXT PAGE


INFORMATION SUMMARY DISPLAY FOR EACH POSITION
HAS ANYONE WON?
NO
YES
BELLIGERENT SPECIFY STRATEGY FOR NEXT MOVE
BEGIN NEXT CYCLE
1
GAME HISTORY DISPLAY
END

3.2 Detailed Decision Logic

This section contains detailed logical flow charts suitable for developing a prototype computer simulation of the AGILE/COIN Game. They are organized into three major groups, corresponding to the three major submodels of the simulation:

BELLIGERENT ROUTINES

COMMUNICATION ROUTINES

VILLAGE ROUTINES

Each of these is comprised of several subroutines. It is through these subroutines that the various elements of the model are allowed to interact dynamically.

As discussed in Section 1.0 of this Appendix, these flow charts indicate only the computer, i.e., machine mode, of decision-making. To provide the man-machine features, the logic of the analyst and player decision-making modes (see Section 2.0 of this Appendix) must be incorporated with these charts.

BELLIGERENT ROUTINES

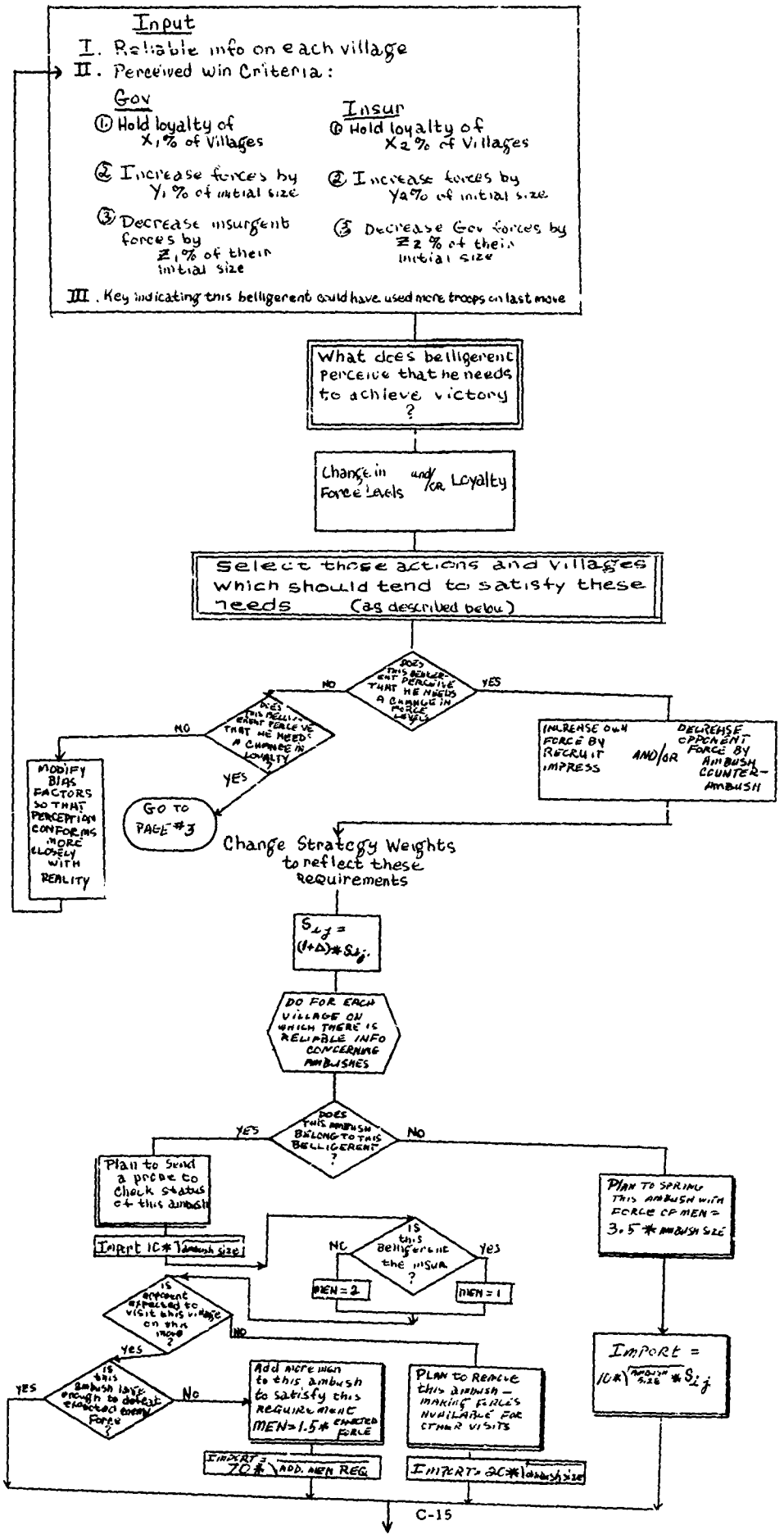
1. Move Plan
2. Action Type I
3. Action Type II
4. Fight
5. Review

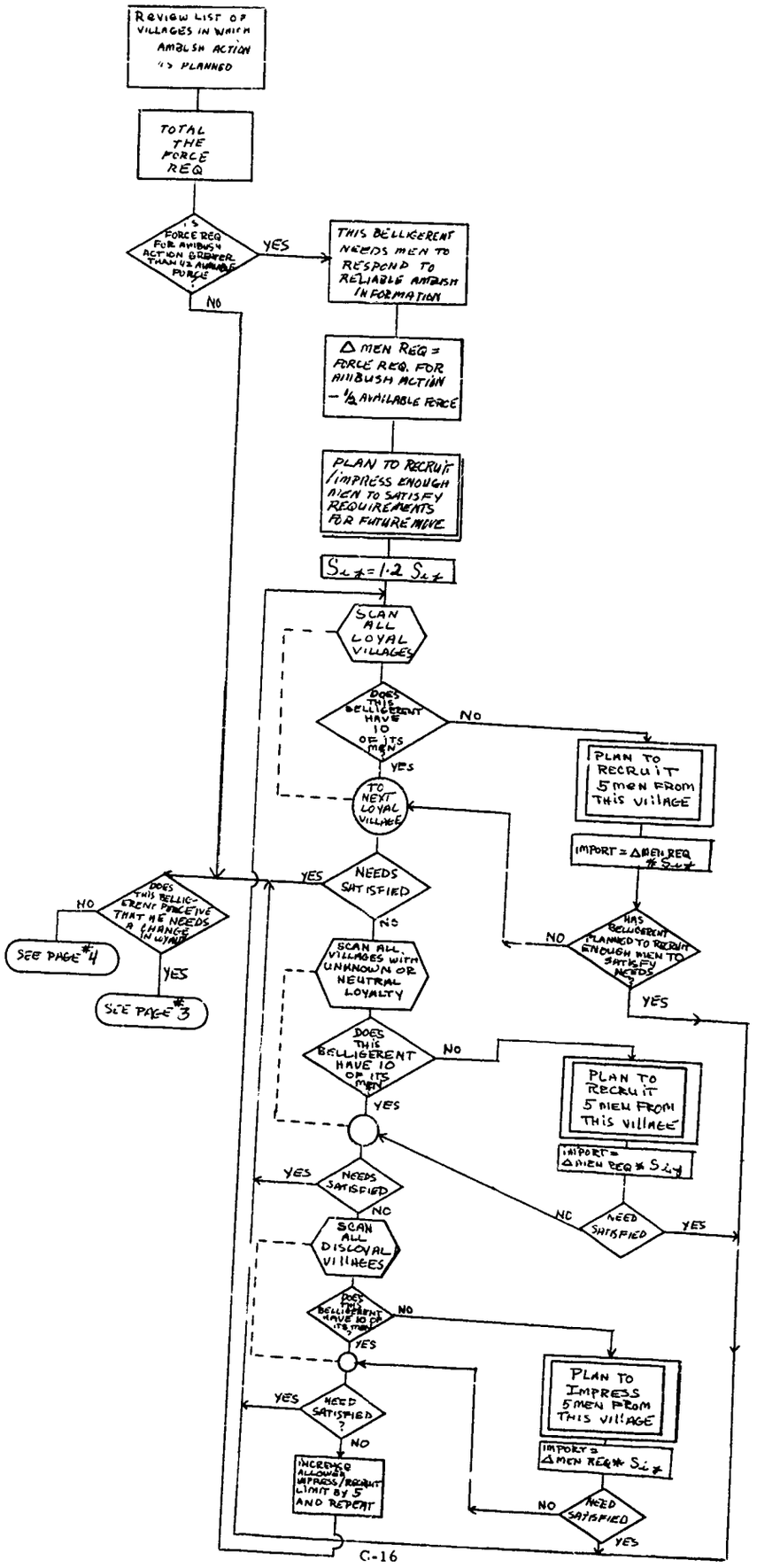
Belligerent Move Plan

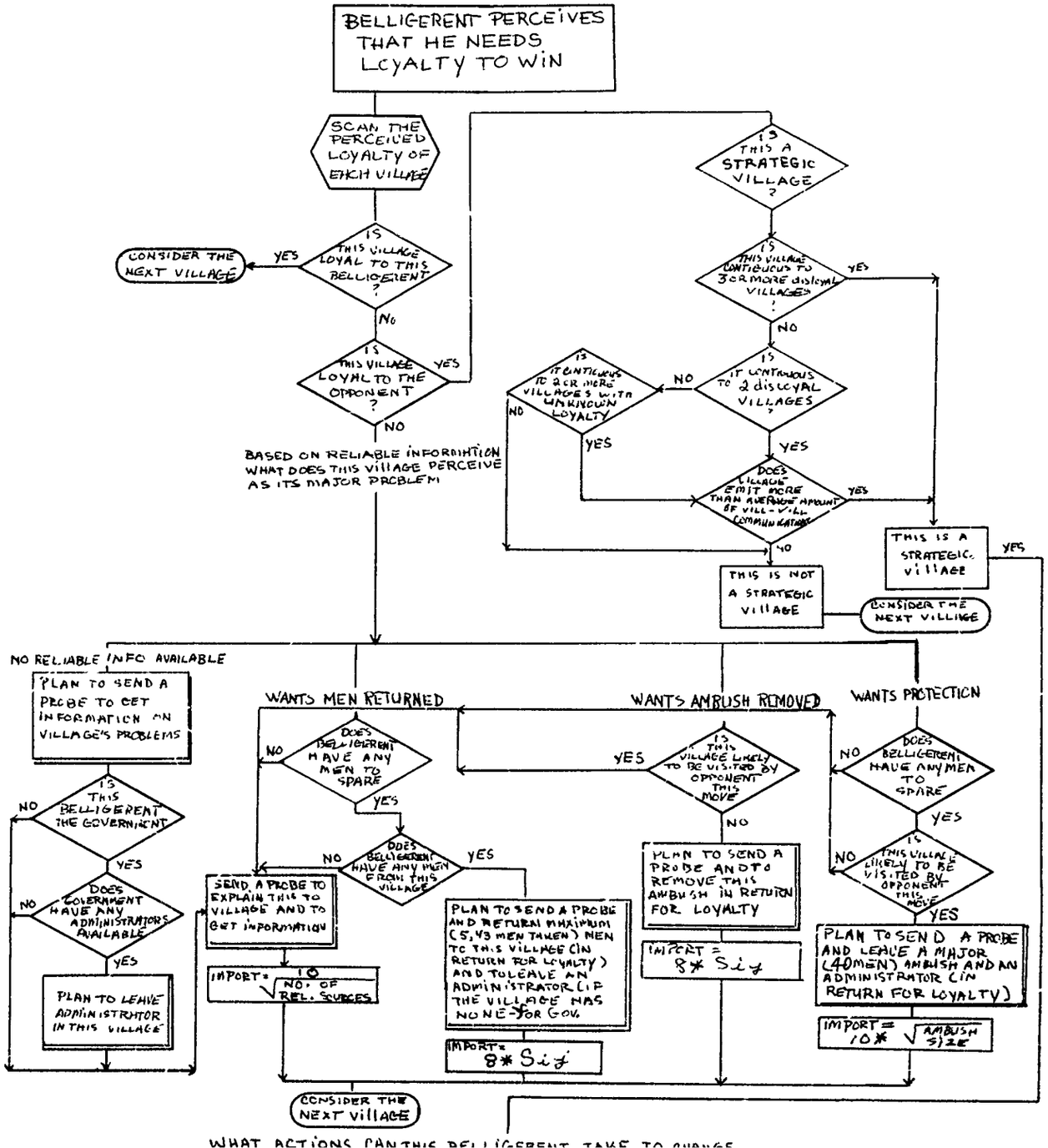
Prepares the list of villages to be visited during the move, the number of men assigned to visit each village, and the purpose(s) of each visit. (When there are multiple purposes for visiting a village, these purposes are ordered according to their importance in decreasing order.)

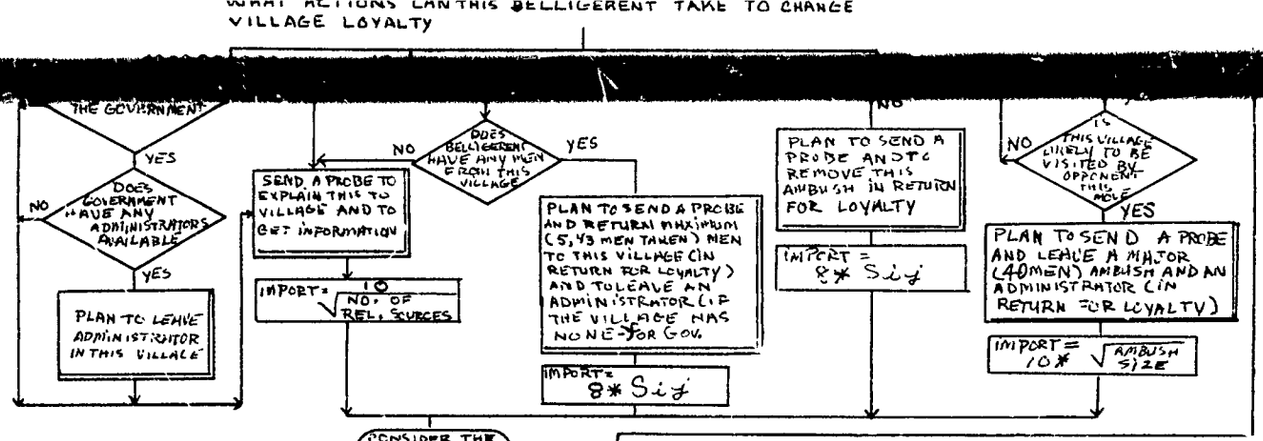
Basically the elements on this list are determined by what the belligerent perceives that he needs to achieve victory -- shifts in loyalty and/or relative force levels. The belligerent then selects those actions and villages which tend to satisfy the perceived needs. To induce selection of the most effective actions to satisfy these needs, there is a gradual shift in the strategic weights associated with the desirable actions.

Belligerent Move Plan Routine


Input
I. Reliable info on each village
II. Perceived win Criteria:
Gov
① Hold loyalty of X1% of Villages
② Increase forces by Y1% of initial size
③ Decrease insurgent forces by Z1% of their initial size
Insur
① Hold loyalty of X2% of Villages
② Increase forces by Y2% of initial size
③ Decrease Gov forces by Z2% of their initial size
III. Key indicating this belligerent could have used more troops on last move
What does belligerent perceive that he needs to achieve victory ?
Change in Force Levels and/or Loyalty
Select those actions and villages which should tend to satisfy these needs (as described below)
DOES THIS BELLIGERENT PERCEIVE THAT HE NEEDS A CHANGE IN FORCE LEVELS ?
NO
YES
DOES THIS BELLIGERENT PERCEIVE THAT HE NEEDS A CHANGE IN LOYALTY ?
NO
YES
MODIFY BIAS FACTORS SO THAT PERCEPTION CONFORMS MORE CLOSELY WITH REALITY
GO TO PAGE #3
INCREASE OWN FORCE BY RECRUIT IMPRESS AND/OR DECREASE OPPONENT FORCE BY AMBUSH COUNTER-AMBUSH
Change Strategy Weights to reflect these Requirements
$S_{ij} = (1+\Delta) * S_{ij}$
DO FOR EACH VILLAGE ON WHICH THERE IS RELIABLE INFO CONCERNING AMBUSHES
DOES THIS AMBUSH BELONG TO THIS BELLIGERENT ?
YES
NO
Plan to send a probe to check status of this ambush
Import IC* (ambush size)
IS this belligerent the INSUR ?
NO
YES
MEN = 2
MEN = 1
IS opponent expected to visit this village on this move ?
NO
YES
IS this ambush large enough to defeat expected enemy force ?
YES
NO
Add more men to this ambush to satisfy this REQUIREMENT MEN ≥ 1.5* EXPECTED FORCE
IMPORT = 70* (ADD. MEN REQ.
PLAN TO REMOVE this ambush — MAKING FORCES AVAILABLE FOR OTHER VISITS
IMPORT = 2C* (ambush size)
PLAN TO SPRING THIS AMBUSH WITH FORCE OF MEN = 3.5 * AMBUSH SIZE
IMPORT = IC* (AMBUSH SIZE) * S_{ij}


REVIEW LIST OF VILLAGES IN WHICH AMBUSH ACTION IS PLANNED
TOTAL THE FORCE REQ
IS FORCE REQ FOR AMBUSH ACTION GREATER THAN 1/2 AVAILABLE FORCE ?
YES
NO
THIS BELLIGERENT NEEDS MEN TO RESPOND TO RELIABLE AMBUSH INFORMATION
Δ MEN REQ = FORCE REQ. FOR AMBUSH ACTION − 1/2 AVAILABLE FORCE
PLAN TO RECRUIT/IMPRESS ENOUGH MEN TO SATISFY REQUIREMENTS FOR FUTURE MOVE
$S_{L\neq} = 1.2\ S_{L\neq}$
SCAN ALL LOYAL VILLAGES
DOES THIS BELLIGERENT HAVE 10 OF ITS MEN ?
NO
YES
PLAN TO RECRUIT 5 MEN FROM THIS VILLAGE
IMPORT = Δ MEN REQ * $S_{L\neq}$
TO NEXT LOYAL VILLAGE
NEEDS SATISFIED
YES
NO
DOES THIS BELLIGERENT PERCEIVE THAT HE NEEDS A CHANGE IN LOYALTY
NO
SEE PAGE #4
YES
SEE PAGE #3
HAS BELLIGERENT PLANNED TO RECRUIT ENOUGH MEN TO SATISFY NEEDS ?
NO
YES
SCAN ALL VILLAGES WITH UNKNOWN OR NEUTRAL LOYALTY
DOES THIS BELLIGERENT HAVE 10 OF ITS MEN ?
NO
YES
PLAN TO RECRUIT 5 MEN FROM THIS VILLAGE
IMPORT = Δ MEN REQ * $S_{L\neq}$
NEEDS SATISFIED
YES
NO
NEED SATISFIED
NO
YES
SCAN ALL DISLOYAL VILLAGES
DOES THIS BELLIGERENT HAVE 10 OF ITS MEN ?
NO
YES
PLAN TO IMPRESS 5 MEN FROM THIS VILLAGE
IMPORT = Δ MEN REQ * $S_{L\neq}$
NEED SATISFIED ?
YES
NO
NEED SATISFIED
NO
YES
INCREASE ALLOWED IMPRESS/RECRUIT LIMIT BY 5 AND REPEAT


BELLIGERENT PERCEIVES THAT HE NEEDS LOYALTY TO WIN
SCAN THE PERCEIVED LOYALTY OF EACH VILLAGE
IS THIS VILLAGE LOYAL TO THIS BELLIGERENT ?
YES
CONSIDER THE NEXT VILLAGE
NO
IS THIS VILLAGE LOYAL TO THE OPPONENT ?
YES
NO
BASED ON RELIABLE INFORMATION WHAT DOES THIS VILLAGE PERCEIVE AS ITS MAJOR PROBLEM?
IS THIS A STRATEGIC VILLAGE ?
IS THIS VILLAGE CONTIGUOUS TO 3 OR MORE DISLOYAL VILLAGES ?
YES
NO
IS IT CONTIGUOUS TO 2 DISLOYAL VILLAGES ?
NO
IS IT CONTIGUOUS TO 2 OR MORE VILLAGES WITH UNKNOWN LOYALTY
NO
YES
YES
DOES VILLAGE EMIT MORE THAN AVERAGE AMOUNT OF VILL-VILL COMMUNICATION
YES
NO
THIS IS NOT A STRATEGIC VILLAGE
CONSIDER THE NEXT VILLAGE
THIS IS A STRATEGIC VILLAGE
YES
NO RELIABLE INFO AVAILABLE
PLAN TO SEND A PROBE TO GET INFORMATION ON VILLAGE'S PROBLEMS
IS THIS BELLIGERENT THE GOVERNMENT
NO
YES
DOES GOVERNMENT HAVE ANY ADMINISTRATORS AVAILABLE
NO
YES
PLAN TO LEAVE ADMINISTRATOR IN THIS VILLAGE
WANTS MEN RETURNED
DOES BELLIGERENT HAVE ANY MEN TO SPARE
NO
YES
DOES BELLIGERENT HAVE ANY MEN FROM THIS VILLAGE
NO
YES
SEND A PROBE TO EXPLAIN THIS TO VILLAGE AND TO GET INFORMATION
IMPORT = 10 / √NO. OF REL. SOURCES
PLAN TO SEND A PROBE AND RETURN MAXIMUM (5, V3 MEN TAKEN) MEN TO THIS VILLAGE (IN RETURN FOR LOYALTY) AND TO LEAVE AN ADMINISTRATOR (IF THE VILLAGE HAS NONE FOR GOV.
IMPORT = 8 * Sij
WANTS AMBUSH REMOVED
IS THIS VILLAGE LIKELY TO BE VISITED BY OPPONENT THIS MOVE
YES
NO
PLAN TO SEND A PROBE AND TO REMOVE THIS AMBUSH IN RETURN FOR LOYALTY
IMPORT = 8 * Sij
WANTS PROTECTION
DOES BELLIGERENT HAVE ANY MEN TO SPARE
NO
YES
IS THIS VILLAGE LIKELY TO BE VISITED BY OPPONENT THIS MOVE
NO
YES
PLAN TO SEND A PROBE AND LEAVE A MAJOR (40 MEN) AMBUSH AND AN ADMINISTRATOR (IN RETURN FOR LOYALTY)
IMPORT = 10 * √AMBUSH SIZE
CONSIDER THE NEXT VILLAGE
WHAT ACTIONS CAN THIS BELLIGERENT TAKE TO CHANGE


WHAT ACTIONS CAN THIS BELLIGERENT TAKE TO CHANGE VILLAGE LOYALTY
THE GOVERNMENT
YES
DOES GOVERNMENT HAVE ANY ADMINISTRATORS AVAILABLE
NO
YES
PLAN TO LEAVE ADMINISTRATOR IN THIS VILLAGE
DOES BELLIGERENT HAVE ANY MEN FROM THIS VILLAGE
NO
YES
SEND A PROBE TO EXPLAIN THIS TO VILLAGE AND TO GET INFORMATION
IMPORT= 10 √NO. OF REL. SOURCES
PLAN TO SEND A PROBE AND RETURN MAXIMUM (.5, 1/3 MEN TAKEN) MEN TO THIS VILLAGE (IN RETURN FOR LOYALTY) AND TO LEAVE AN ADMINISTRATOR (IF THE VILLAGE HAS NONE) FOR GOV.
IMPORT= 8* Sij
NO
PLAN TO SEND A PROBE AND TO REMOVE THIS AMBUSH IN RETURN FOR LOYALTY
IMPORT = 8* Sij
IS THIS VILLAGE LIKELY TO BE VISITED BY OPPONENT THIS MOVE
NO
YES
PLAN TO SEND A PROBE AND LEAVE A MAJOR (40 MEN) AMBUSH AND AN ADMINISTRATOR (IN RETURN FOR LOYALTY)
IMPORT = 10* √AMBUSH SIZE
CONSIDER THE NEXT VILLAGE

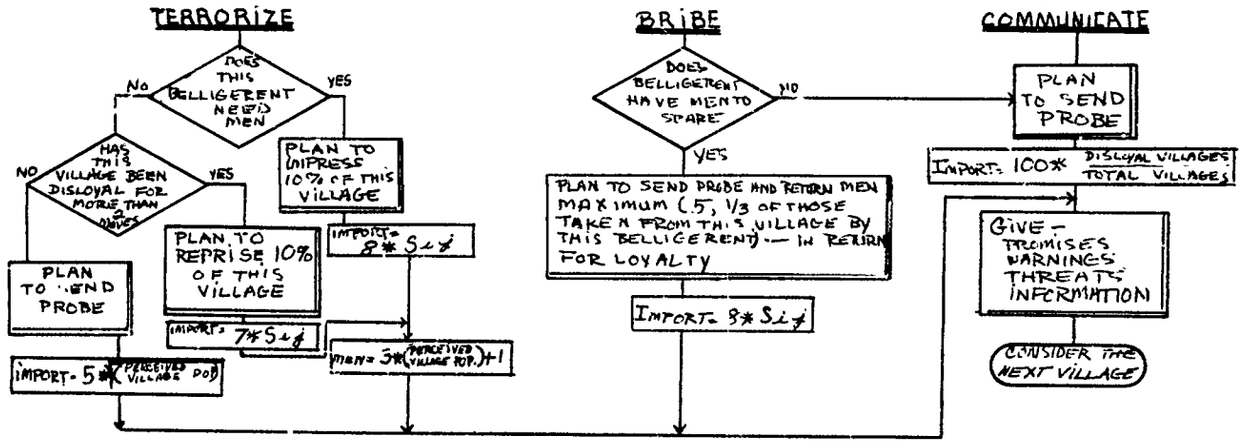
WHAT ACTIONS CAN THIS BELLIGERENT TAKE TO CHANGE VILLAGE LOYALTY

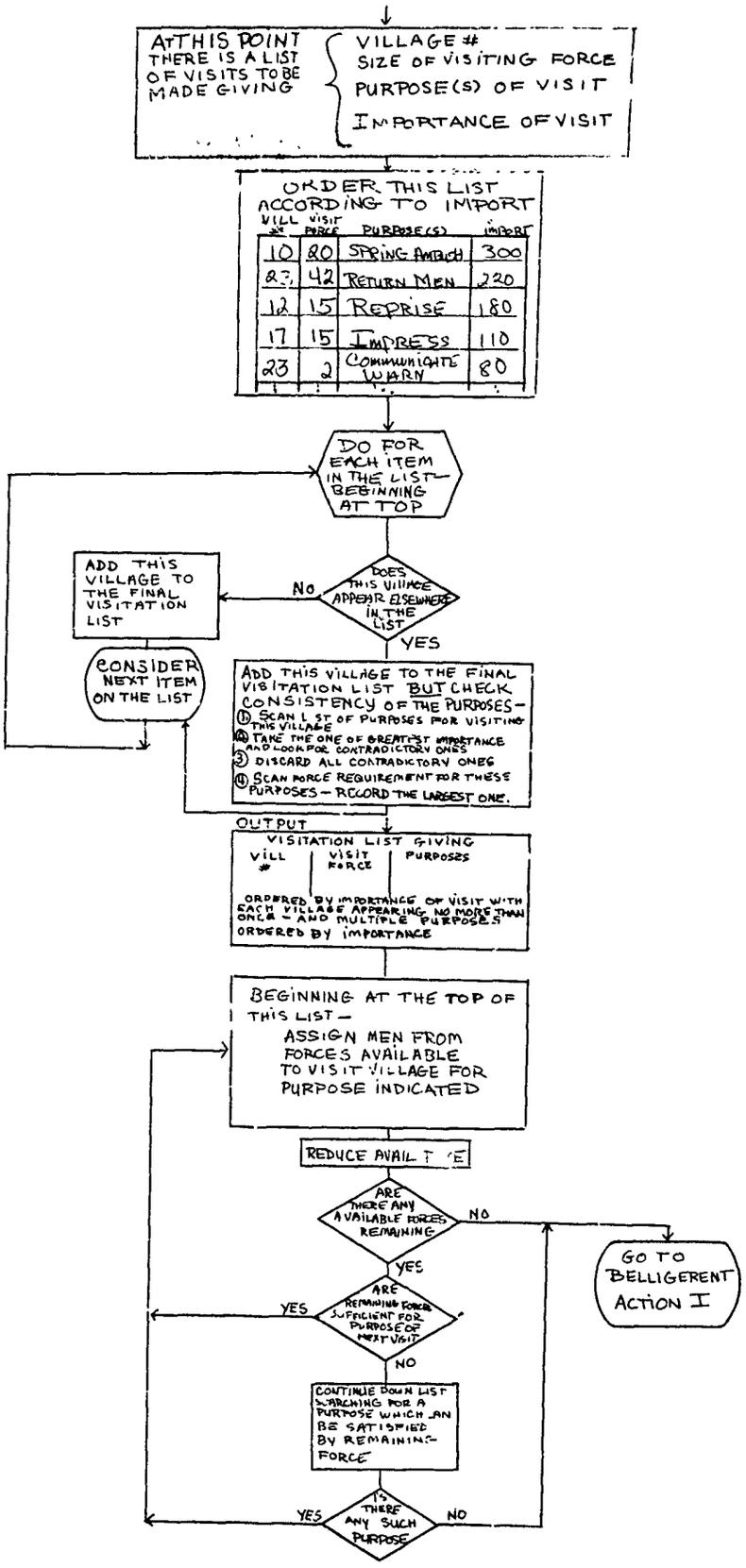
TERRORIZE | BRIBE | COMMUNICATE

Action selected depends on belligerent policy - See Decision Table #1

DECISION TABLE #1

POLICY	Alternative Actions: Terrorize	Alternative Actions: Bribe	Additional Action: Communicate
FIRM	X		X
CAUTIOUS		X	X
DPRING	X		X
MAINTAIN FRIENDSHIP		X	X

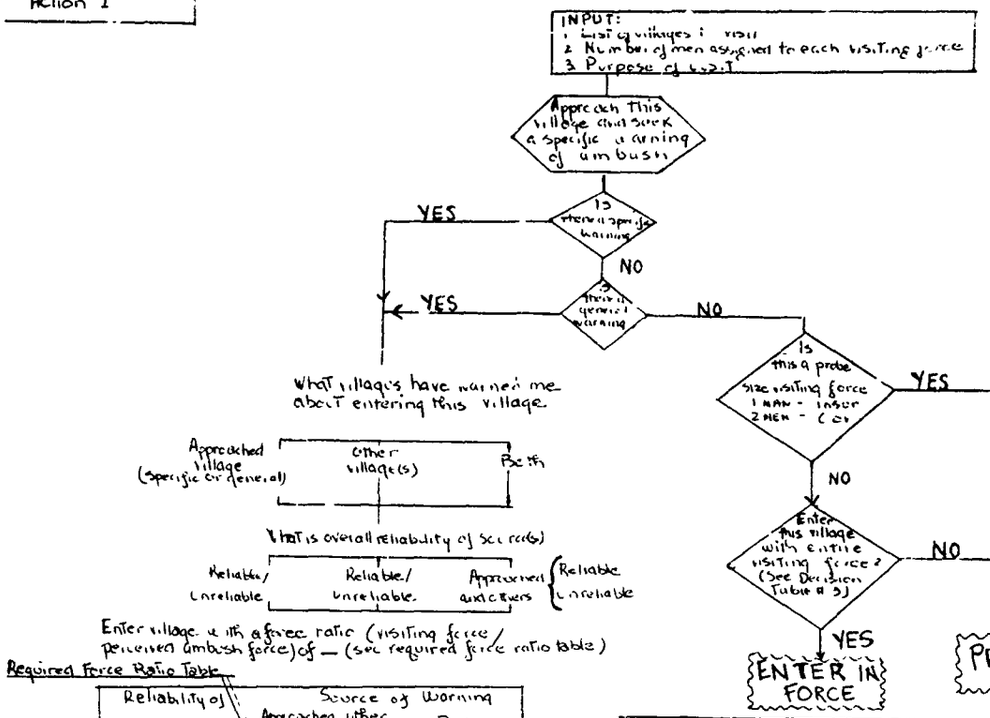

TERRORIZE
DOES THIS BELLIGERENT NEED MEN
NO
YES
HAS THIS VILLAGE BEEN DISLOYAL FOR MORE THAN 2 MOVES
NO
YES
PLAN TO SEND PROBE
IMPORT= 5* (PERCEIVED VILLAGE POP)
PLAN TO REPRISE 10% OF THIS VILLAGE
IMPORT= 7* Sij
PLAN TO IMPRESS 10% OF THIS VILLAGE
IMPORT= 8* Sij
MEN= 3* (PERCEIVED VILLAGE POP.)+1
BRIBE
DOES BELLIGERENT HAVE MEN TO SPARE
NO
YES
PLAN TO SEND PROBE AND RETURN MEN MAXIMUM (.5, 1/3 OF THOSE TAKEN FROM THIS VILLAGE BY THIS BELLIGERENT) — IN RETURN FOR LOYALTY
IMPORT= 8* Sij
COMMUNICATE
PLAN TO SEND PROBE
IMPORT= 100* DISLOYAL VILLAGES / TOTAL VILLAGES
GIVE — PROMISES, WARNINGS, THREATS, INFORMATION
CONSIDER THE NEXT VILLAGE


AT THIS POINT THERE IS A LIST OF VISITS TO BE MADE GIVING
VILLAGE #
SIZE OF VISITING FORCE
PURPOSE(S) OF VISIT
IMPORTANCE OF VISIT
ORDER THIS LIST ACCORDING TO IMPORT
VILL # | VISIT FORCE | PURPOSE(S) | IMPORT
10 | 80 | SPRING AMBUSH | 300
83 | 42 | RETURN MEN | 220
12 | 15 | REPRISE | 180
17 | 15 | IMPRESS | 110
23 | 2 | COMMUNICATE WARN | 80
DO FOR EACH ITEM IN THE LIST BEGINNING AT TOP
DOES THIS VILLAGE APPEAR ELSEWHERE IN THE LIST
No
ADD THIS VILLAGE TO THE FINAL VISITATION LIST
YES
CONSIDER NEXT ITEM ON THE LIST
ADD THIS VILLAGE TO THE FINAL VISITATION LIST BUT CHECK CONSISTENCY OF THE PURPOSES –
1. SCAN LIST OF PURPOSES FOR VISITING THIS VILLAGE
2. TAKE THE ONE OF GREATEST IMPORTANCE AND LOOK FOR CONTRADICTORY ONES
3. DISCARD ALL CONTRADICTORY ONES
4. SCAN FORCE REQUIREMENT FOR THESE PURPOSES – RECORD THE LARGEST ONE.
OUTPUT
VISITATION LIST GIVING
VILL # | VISIT FORCE | PURPOSES
ORDERED BY IMPORTANCE OF VISIT WITH EACH VILLAGE APPEARING NO MORE THAN ONCE – AND MULTIPLE PURPOSES ORDERED BY IMPORTANCE
BEGINNING AT THE TOP OF THIS LIST –
ASSIGN MEN FROM FORCES AVAILABLE TO VISIT VILLAGE FOR PURPOSE INDICATED
REDUCE AVAILABLE
ARE THERE ANY AVAILABLE FORCES REMAINING
NO
YES
GO TO BELLIGERENT ACTION I
ARE REMAINING FORCES SUFFICIENT FOR PURPOSE OF NEXT VISIT
YES
NO
CONTINUE DOWN LIST SEARCHING FOR A PURPOSE WHICH CAN BE SATISFIED BY REMAINING FORCE
IS THERE ANY SUCH PURPOSE
YES
NO

Belligerent Action I

Using the village visitation list (prepared by the BELLIGERENT MOVE PLAN routine), this routine reacts to the village warning tactics decision. It uses all available information on the village and the belligerent's policy to decide upon which action to take with respect to the village. Three alternative actions are allowed: GO AWAY, PROBE, ENTER IN FORCE.

BELLIGERENT
Action I


INPUT:
1 List of villages I visit
2 Number of men assigned to each visiting force
3 Purpose of visit
Approach this village and seek a specific warning of ambush
Is there a specific warning
YES
NO
Is there a general warning
YES
NO
What villages have warned me about entering this village
Approached village (specific or general)
Other village(s)
Both
What is overall reliability of source(s)
Reliable/ Unreliable
Reliable/ Unreliable
Approached and others
Reliable
Unreliable
Enter village with force ratio (visiting force / perceived ambush force) of — (see required force ratio table)
Is this a probe size visiting force 1 MAN - insur 2 MEN - Cer
YES
NO
Enter this village with entire visiting force? (See Decision Table # 3)
NO
YES
ENTER IN FORCE
PROBE

Required Force Ratio Table

Reliability of Source	Source of Warning: Approached village	Other village(s)	Both
Reliable / Unreliable			
Approached Reliable / Reliable			
Approached Reliable / Unreliable			
Other(s) Reliable / Unreliable			
Both Reliable / Unreliable			

Does visiting force satisfy force ratio required
YES
NO

Decision Table # 2

Policy \ Alternative Actions	Go Away	Probe	Enter in Force	Go Away	Probe	Enter in Force
Firm						
Cautious						
Daring						
Maintain Reputation						

X = Indicates action to be taken under each policy as a function of perceived force ratio required

Decision Table # 3

Village is perceived as	Number of villages on visitation list	Alternative Actions: Probe	Enter in Force
LOYAL	MANY		X
	FEW	X	
NOT LOYAL	MANY	X	
	FEW	X	

Definitions -

--Specific Warning can be given only by the village containing the ambush and only when the village is approached by a visiting force

--Specific Information Must Provide the Numerical size of ambush

--All other warnings about a village are considered general warnings

--General Warning may be given to either Belligerent by any village. It does not provide accurate information on the size of the ambush force-it may provide {small / medium / large} information

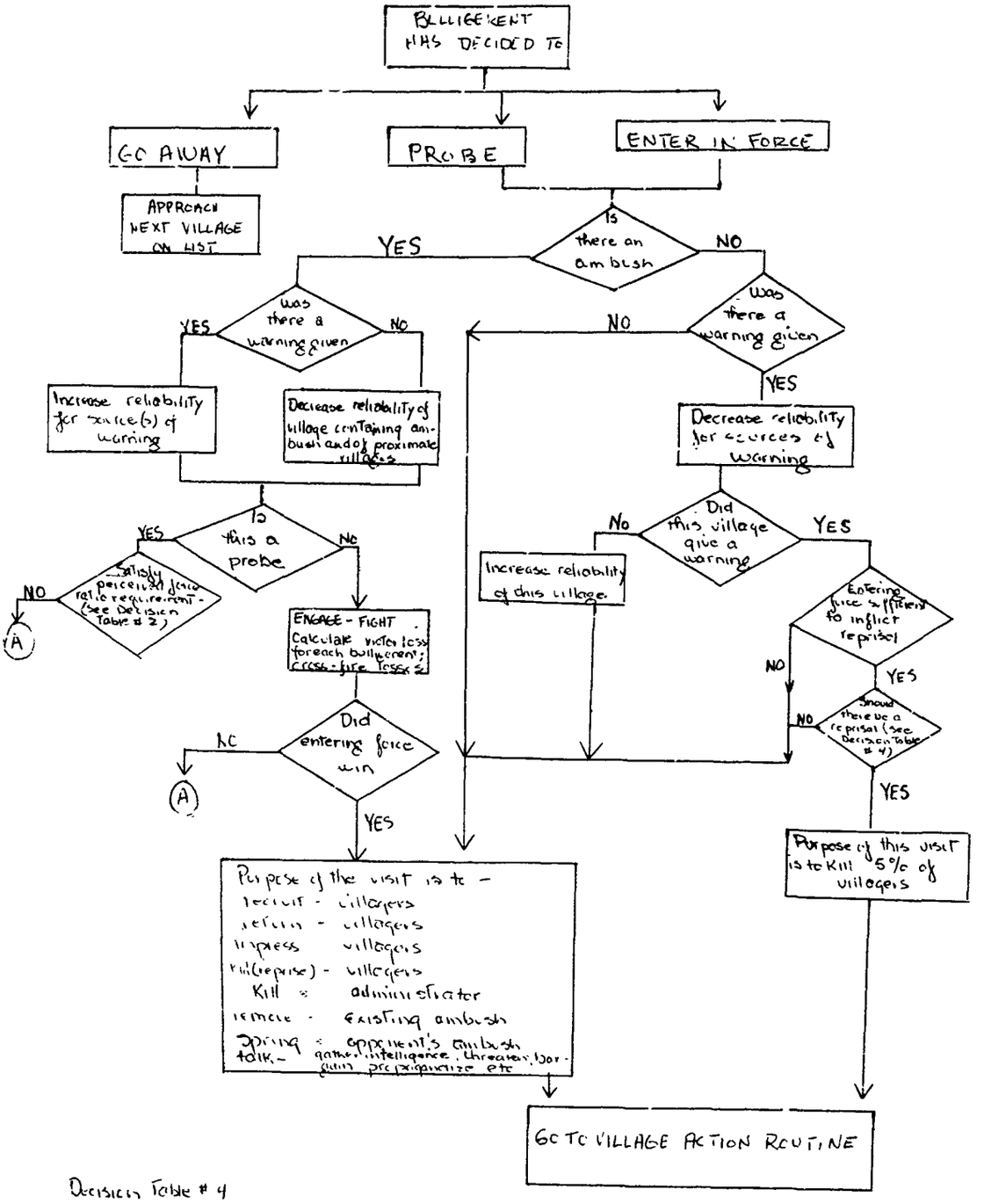
--Both specific and general warnings refer to information on ambush
They should not be confused with threats, etc

--Only the force originally assigned to visit a village may be used in entering that village

Belligerent Action II

Given the action to be taken (from I above) this routine either skips to the next village (GO AWAY) or enters the village with a probe or in-force. Having entered the village, the belligerent either is forced out of the village (in which case he skips to the next village) or eventually communicates the purpose of the visit to this village. This purpose may be either the originally intended purpose (from the visitation list) or a new purpose resulting from a change in the belligerent's perception of the village. This visit purpose is then used as input to the VILLAGE ACTION routine.

BELLIGERENT ACTION II



Decision Table # 4

Village is perceived as	Alternative Actions: Help to Plan	Kill 5% of villagers
Disloyal		X
Not Loyal	X	

Fight

Calculates all losses associated with an engagement.

Using the four descriptions of every battle:-

Number of men in ambush

Number of men in entering force

Number of villages

Does entering force intend to spring an ambush

this routine calculates the effective force of each opponent which then determines the victor.

Using the ratio of the effective forces, the duration of the engagement is determined. The duration, together with the effective force levels. determines the losses of both victor and loser and the crossfire losses. These losses are then deducted from the levels at the start of the engagement.

FIGHT

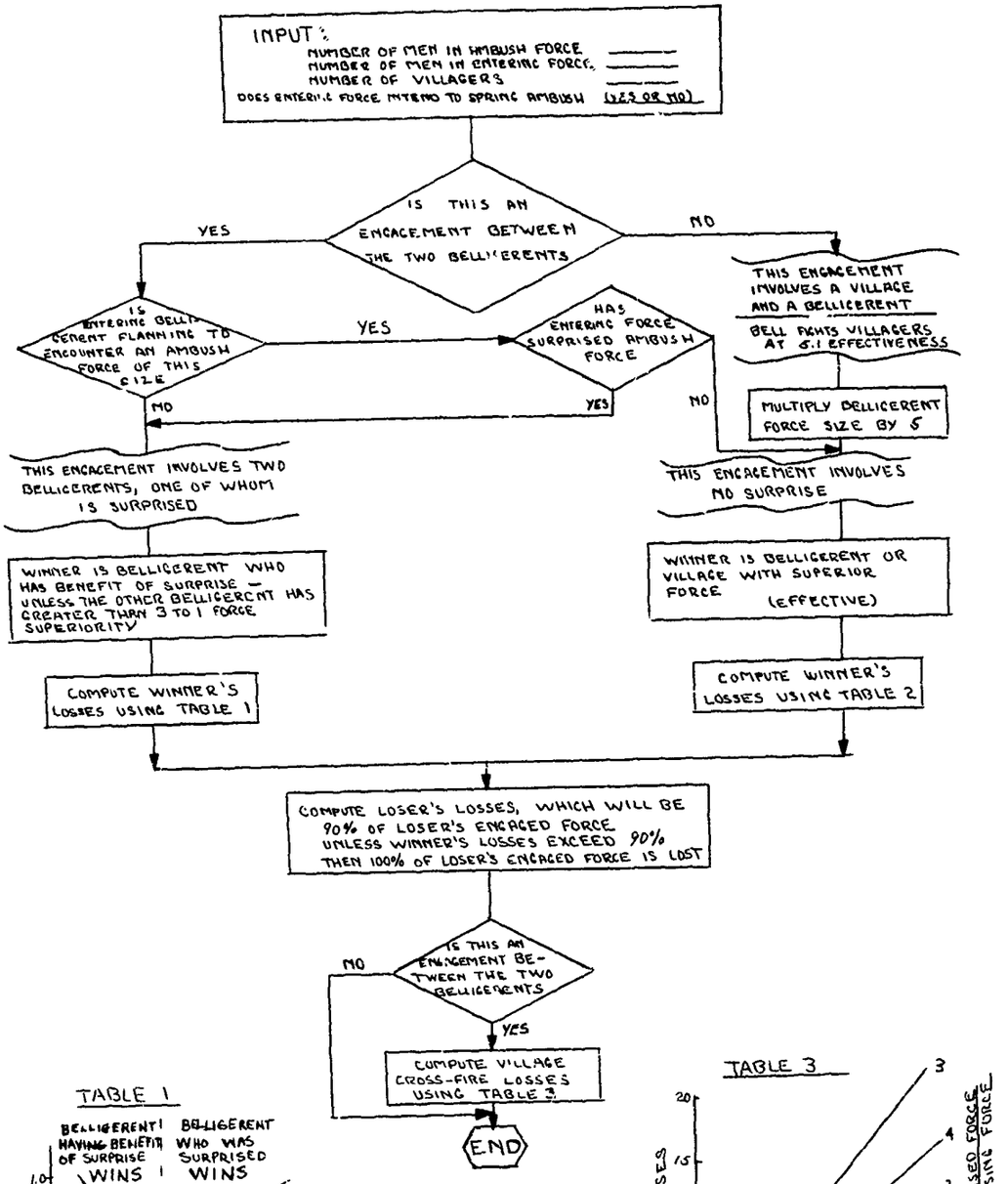

INPUT:
NUMBER OF MEN IN AMBUSH FORCE
NUMBER OF MEN IN ENTERING FORCE
NUMBER OF VILLAGERS
DOES ENTERING FORCE INTEND TO SPRING AMBUSH (YES OR NO)
IS THIS AN ENCAGEMENT BETWEEN THE TWO BELLIGERENTS
YES
NO
IS ENTERING BELLIGERENT PLANNING TO ENCOUNTER AN AMBUSH FORCE OF THIS SIZE
YES
NO
HAS ENTERING FORCE SURPRISED AMBUSH FORCE
YES
NO
THIS ENCAGEMENT INVOLVES A VILLAGE AND A BELLIGERENT
BELL FIGHTS VILLAGERS AT .5 EFFECTIVENESS
MULTIPLY BELLIGERENT FORCE SIZE BY 5
THIS ENCAGEMENT INVOLVES TWO BELLIGERENTS, ONE OF WHOM IS SURPRISED
THIS ENCAGEMENT INVOLVES NO SURPRISE
WINNER IS BELLIGERENT WHO HAS BENEFIT OF SURPRISE — UNLESS THE OTHER BELLIGERENT HAS GREATER THAN 3 TO 1 FORCE SUPERIORITY
WINNER IS BELLIGERENT OR VILLAGE WITH SUPERIOR FORCE (EFFECTIVE)
COMPUTE WINNER'S LOSSES USING TABLE 1
COMPUTE WINNER'S LOSSES USING TABLE 2
COMPUTE LOSER'S LOSSES, WHICH WILL BE 90% OF LOSER'S ENGAGED FORCE UNLESS WINNER'S LOSSES EXCEED 90% THEN 100% OF LOSER'S ENGAGED FORCE IS LOST
NO
IS THIS AN ENGAGEMENT BETWEEN THE TWO BELLIGERENTS
YES
COMPUTE VILLAGE CROSS-FIRE LOSSES USING TABLE 3
END

TABLE 1

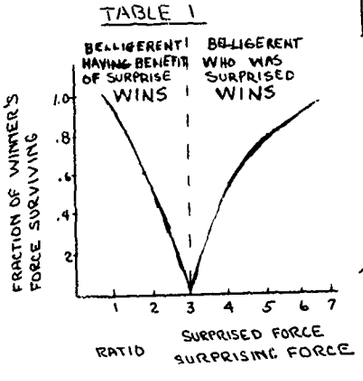


TABLE 2

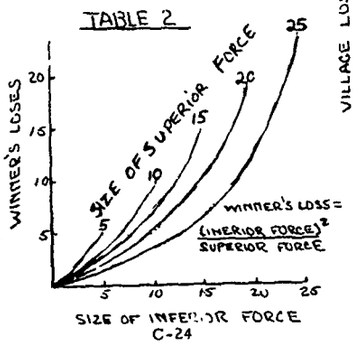
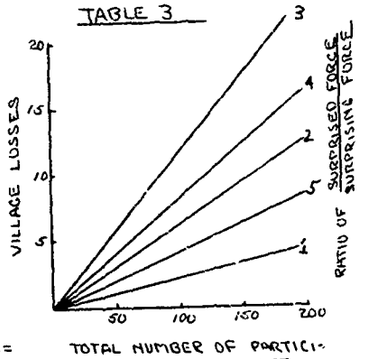


TABLE 3



Belligerent Review

Maintains a three-move history (to allow for the delay in loyalty information) which gives the action employed in each village, the status of the village as perceived by the belligerent, and (when it becomes available) the shift in loyalty which occurred in the village.

This information is then used to update the ALTERNATE ACTION EFFECTIVENESS TABLE. This table provides a summary of loyalty shifts as a function of perceived village status and the action employed. The loyalty shifts associated with each action are averaged and summed over all village states. Whenever the sum exceeds a threshold the strategic weight (which affects policy) assigned to this action is reinforced, positively or negatively, to reflect the apparent desirability of this action. This reinforcement, therefore, induces a gradual shift in strategic weights so that the more effective policies (in terms of loyalty shifts) are preferred.

BELLIGERENT REVIEW

At the end of each visit cycle, each belligerent should record information useful in his future decision-making processes.

There are two types of information which should be especially important:

1A. Loyalty Changes as a function of
- --tactic employed
- --village descriptors

1B Loyalty Information
- --for every village, calculate perceived loyalty change from one cycle to the next
- --for every village visited, keep three-move record on tactic employed and village descriptors (Three move because of delay in receiving loyalty information, loyalty changes noted in one cycle should correlate with tactics employed two moves earlier)

MOVE BEFORE LAST

At Start of Move village perceived as *

Village Visited	Action Employed	Disloyal Many men	Disloyal Few men	Unknown Many men	Unknown Few men	Loyal Many men	Loyal Few men
23	7		-2				
11	12				-1		
6	14			+1			
4	5					+2	
9	2		+3				

* Indicated by □ in appropriate column, into which the change in perceived loyalty is placed when it becomes available (2 moves later)

LAST MOVE

At Start of Move village perceived as

Village Visited	Action Employed	Disloyal Many men	Disloyal Few men	Unknown Many men	Unknown Few men	Loyal Many men	Loyal Few men
6	3		□		□		
13	6					□	
5	13			□			
9	9						□
21	4						

THIS MOVE

At Start of Move village perceived as

Village Visited	Action Employed	Disloyal Many men	Disloyal Few men	Unknown Many men	Unknown Few men	Loyal Many men	Loyal Few men
5	2		□				
4	1				□		
7	11						□
9	10	□					
12	4				□		

RELATIVE EFFECTIVENESS OF ALTERNATE ACTIONS

Village Descriptors	1	2	3	4	5	6
Action 1						
2		CONTAINS ARITHMETIC MEAN OF CHANGES IN PERCEIVED LOYALTY				
3						

Σ ± 1 when this mean summed across all village descriptors
- -1 --falls below a threshold or --falls above a threshold
- $+6$ Then strategic weights
- -10 should be modified to reflect the apparent desireability ($\pm$) of this tactic

* thresholds -- used to distinguish random fluctuation from definite trend e.g., Thres. = ± 3

2A. Engagement History as a function of
- --action (ambush / counter-ambush)
- --perceived force ratios

2B. Engagement History
- --to reflect desireability($\pm$) of engaging with more/less force than force ratio required dictate
- --enables player to change his strategy from more cautious to more daring, etc.

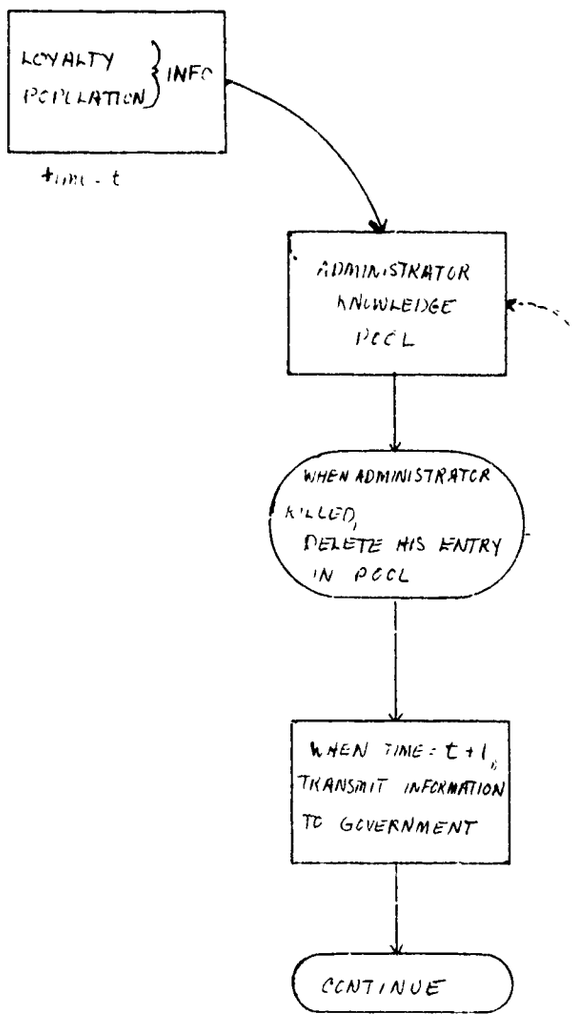
COMMUNICATION ROUTINES

1. Administrator Information
2. Direct Information
3. Perception - Information
4. Perception - Action
5. Propaganda
6. Ripple

Administrator Information

At the beginning of a move cycle, the information which the administrators might observe is placed in an "administrator information pool." If no administrator is present in a village, no information is placed in the pool. As administrators are slain during the move cycle, the corresponding information is blanked out. At the end of the move cycle, the information left in the pool is transmitted to the government.

ADMINISTRATOR COMMUNICATIONS

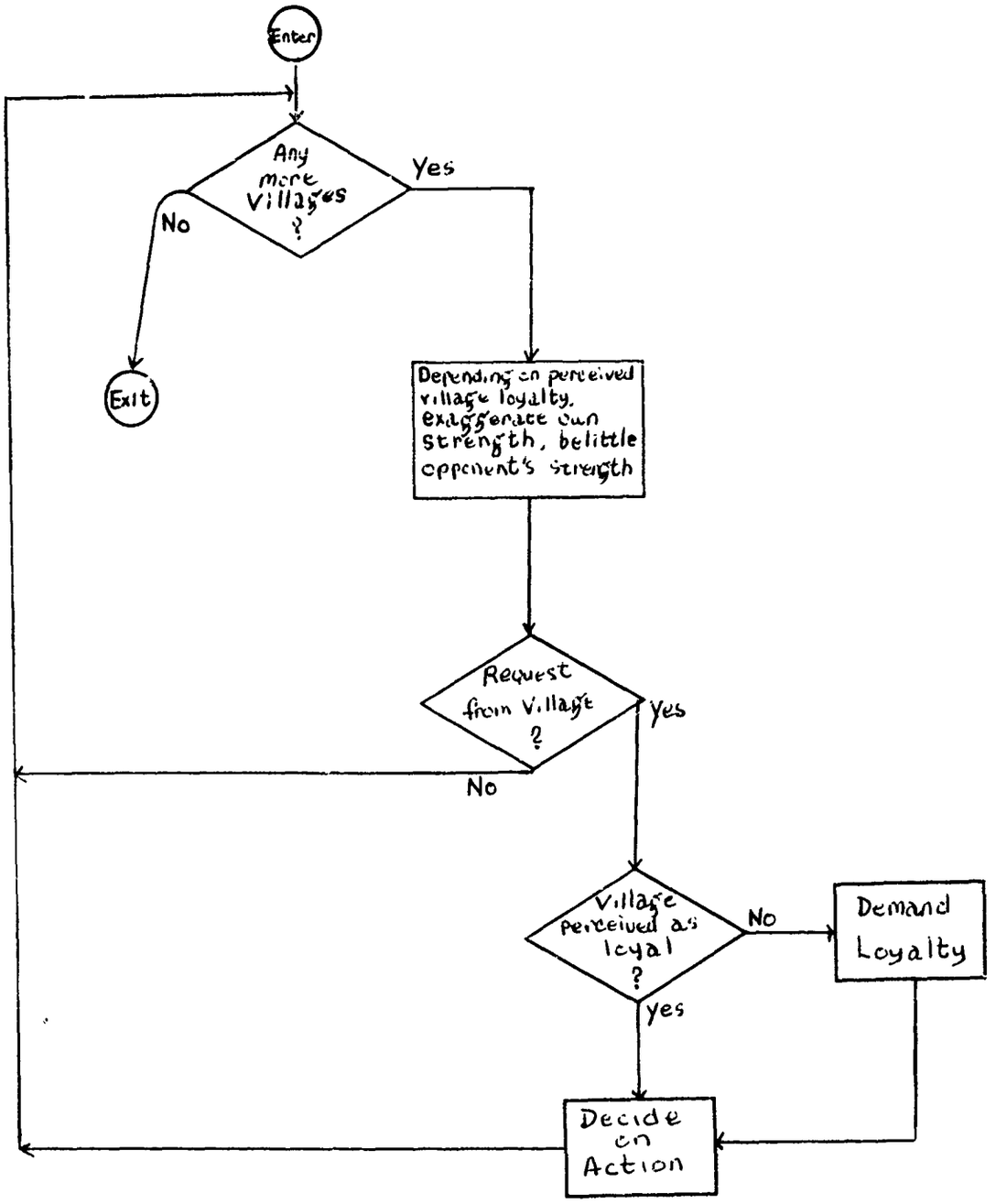


Direct Information

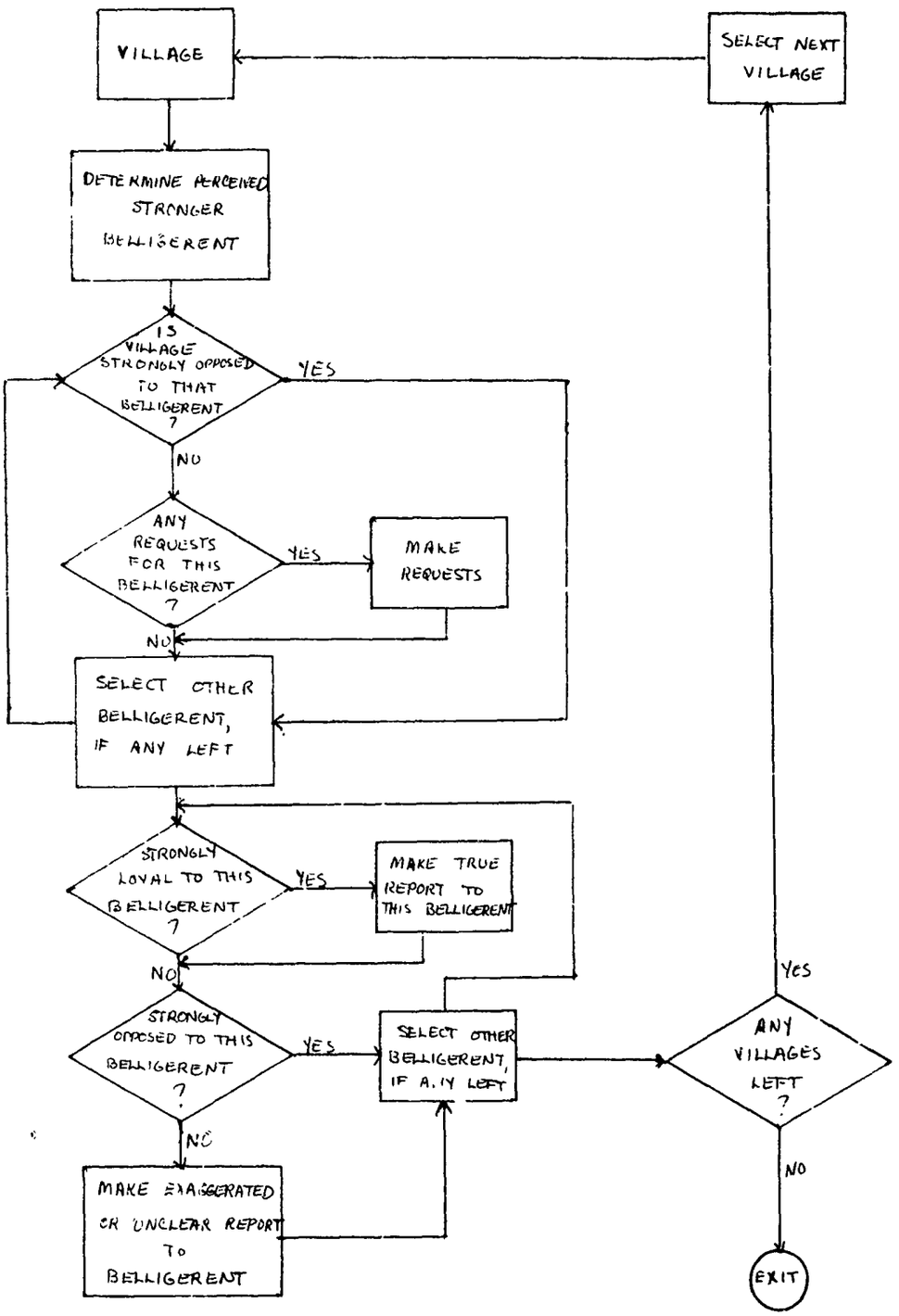
Direct village communications are of two forms. One is simple and consists of one village's polling of a contiguous village's transmitted variable array.

The second form is more complex. A village decides to communicate with one or the other of the belligerents. Depending on his needs and loyalty, the village will make requests, or give true information, or give inaccurate information.

Direct Information: Bellig → Village



DIRECT INFORMATION VILLAGE → BELLIGERENT

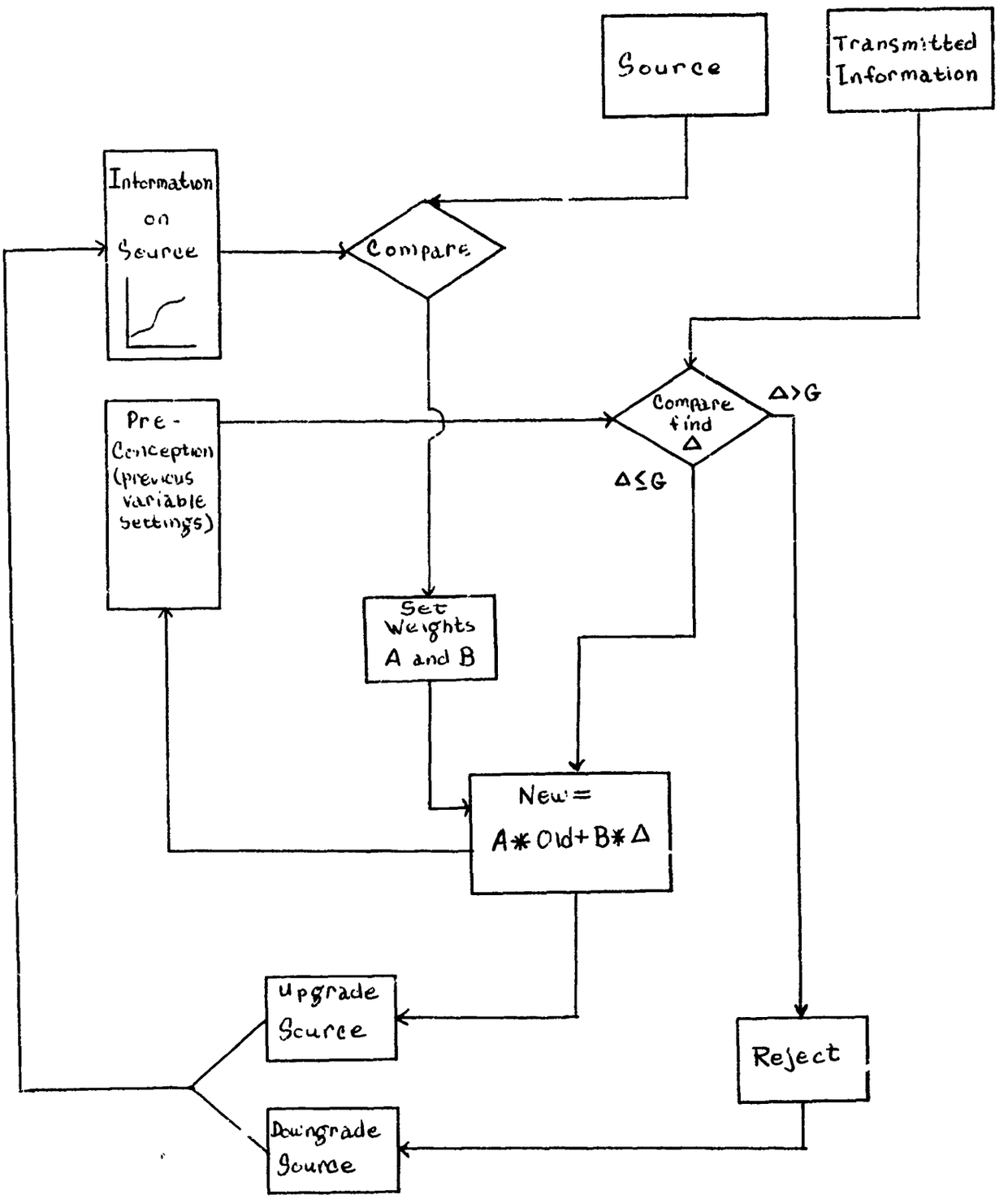


Perception-information

This routine determines what effect incoming information will have on the perceiver's view of the world.

The new value of the perceived variable will fall in between the old value (perviously perceived) and the transmitted value. The amount of change is determined by the affect of the perceiver toward the source and by the nearness of the information to the perceiver's preconception. The affect variable comes from the perceiver's perception of the closeness of the source's loyalty variable to his own; from the history of verification of previous information transmissions from the source; and from the extent to which the perceiver is committed to one side or the other.

Info Perception



Looks Like Me?

$LLM = (LOY_P - (10 - PLOY_S))$

LLM = Looks like me
LOYp= Loyalty of perceiver
$PLOY_S$= Perc. loyalty of source

$0 \leq LLM \leq 10$

Are We Committed?

$AWC = |5 - LOY_P|$

AWC = Are we committed
LOY_P = Loyalty of perceiver

$0 \leq AWC \leq 5$

Loyalty Component of Affect

$$LCA = \frac{LLM * AWC}{5}$$

LCA = Loyalty Component of Affect

$0 \leq LCA \leq 10$

History Component of Affect

$$HCA = 5 * TANH \frac{\#items\ verified - \#\ disproved}{3}$$

$$\Delta_x = x_o + (x_T - x_o)e - \frac{(x_T - x_o)}{\epsilon_x}$$

where

Δ_x = potential change in variable x setting
x_o = old setting of x variable
x_T = transmitted setting of x variable
ϵ_x = "Credibility Constant" of x variable
e = ?

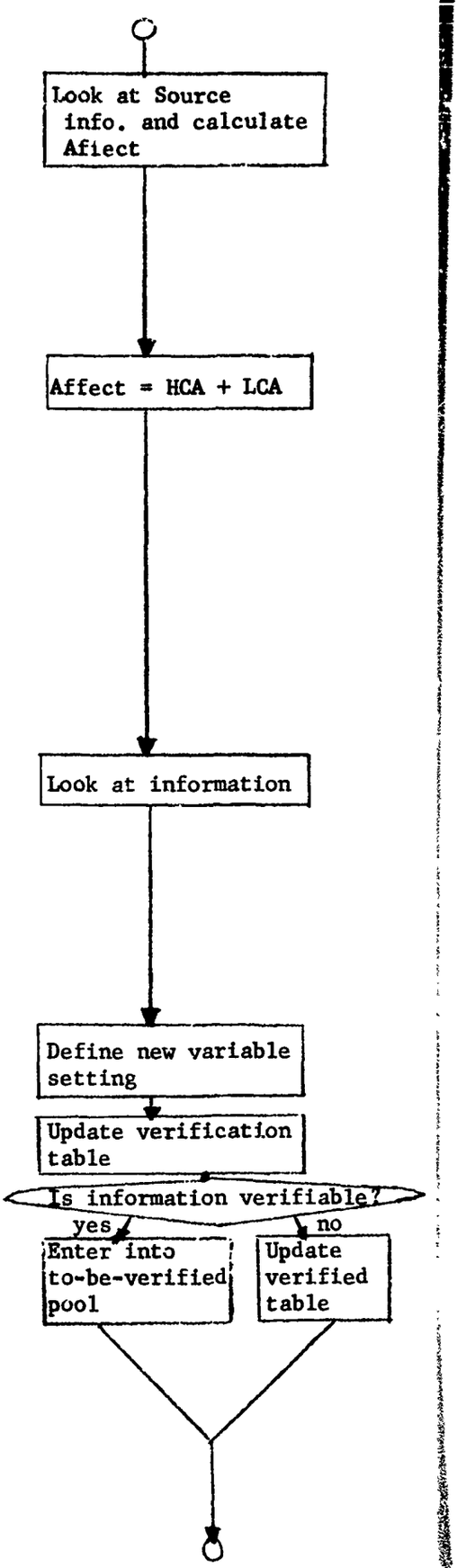
$X_N = Y_o + \Delta * Affect/15$

Is Info. Verifiable?

Yes → enter into pool

No → # verifieds = #verifieds + $\tanh \frac{\epsilon_x - \Delta_x}{K\epsilon_x}$

verifieds = number of transmissions from S verified to date.
ϵ_x = "Credibility Constant" for x variable
Δ_x = potential change of x variable
K = constant



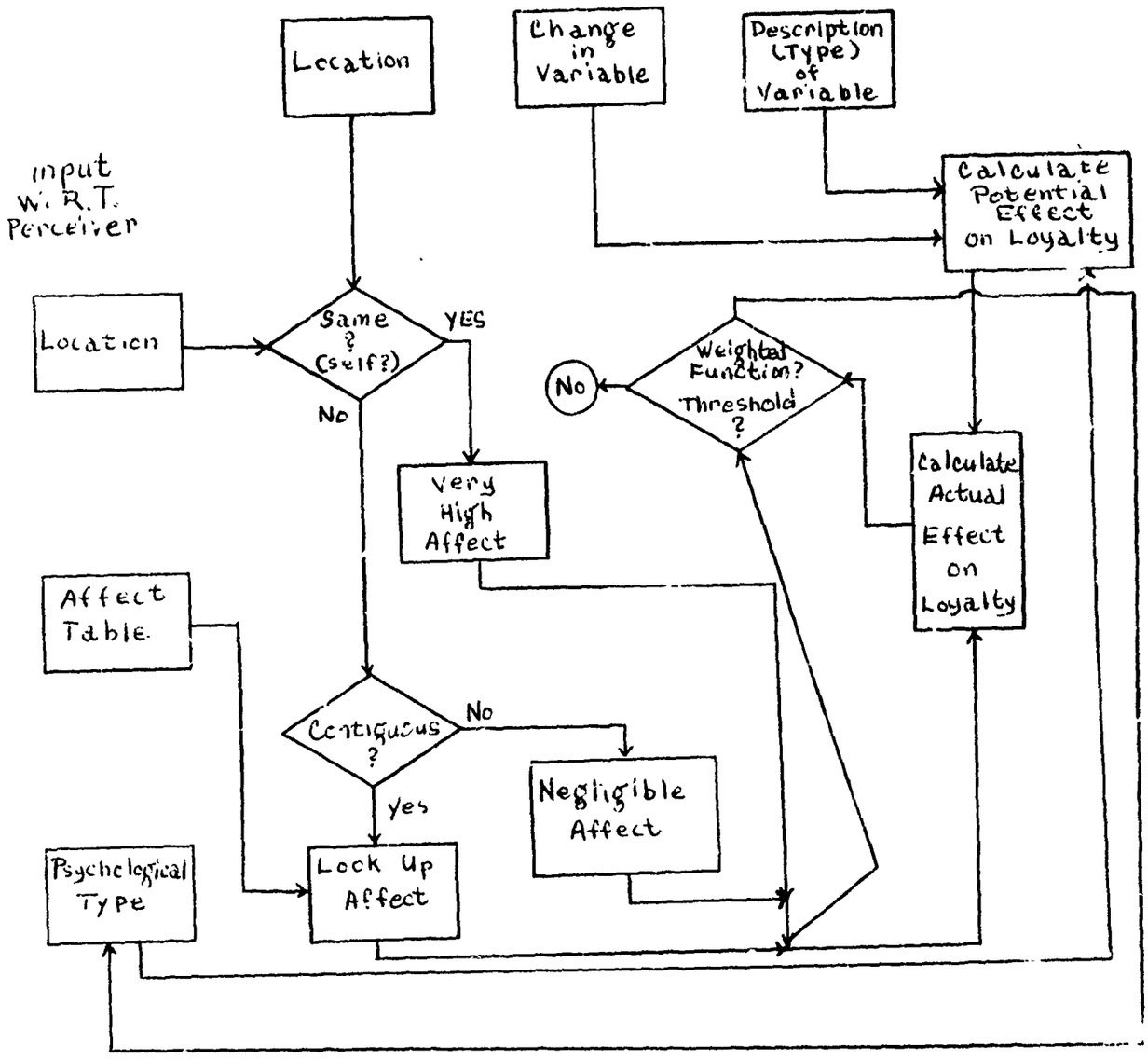
Perception-action

The information perception routine provides a filter through which transmitted information is received by the perceiver. The action perception routine determines the effect on the perceiving villages of the action implicit in the transmitted information.

The change in loyalty of the perceiver depends on the nearness of the action to the location of the perceiver, the psychological typology of the perceiver village, the action involved, the actor and the size of the action, and the affect of the perceiver for the village where the action took place.

Action Perception

Input information on action



Affect Calculation

If (Loc_A .eq. Loc_p) Affect = 60

Affect toward oneself arbitrarily defined as four times maximum affect toward others.

If (Loc_A .eq. Contiguous Village to Perceiver)

Look up Affect in Affect Table (See Info. Transmission Perception)

If (Loc_A .ne. self or neighbor)

Affect = 1 (small)

Perceptual Type Lookup

Look up coefficient (+ or - and fraction) in m x n^2 matrix where:

m = # of possible actions
n = # of village psychological parameters

Potential Loyalty Change = ΔV x coefficient

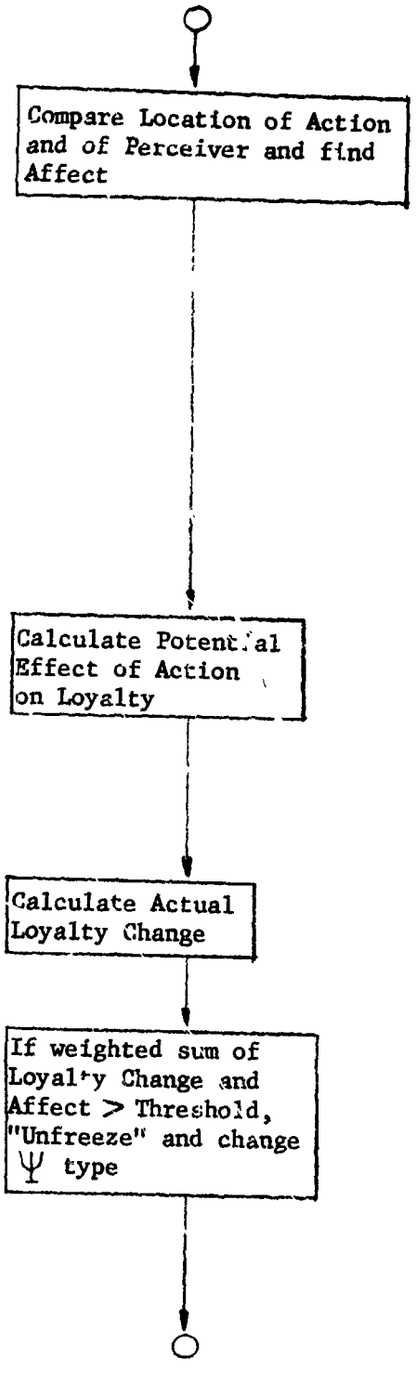
where ΔV = change in the variable

$$\Delta\text{Loyalty} = \frac{\text{Affect}}{15} \times \text{Pot. Loy. Change}$$

(Max. Village-Village Affect = 15)

If $\left\{\left[(\Delta L \ .GE. \ 3)\right]\right.$ .and. $\left[\left[(L_O \ .GT. \ 5)\right.\right.$.and. $(L_N$.LT.5)).or $((L_O$.LT.5).and. $\left.\left.(L_N$.GT.5)$\right)\right]$ .and. (Affect .GT. 15)

Change Ψ Type

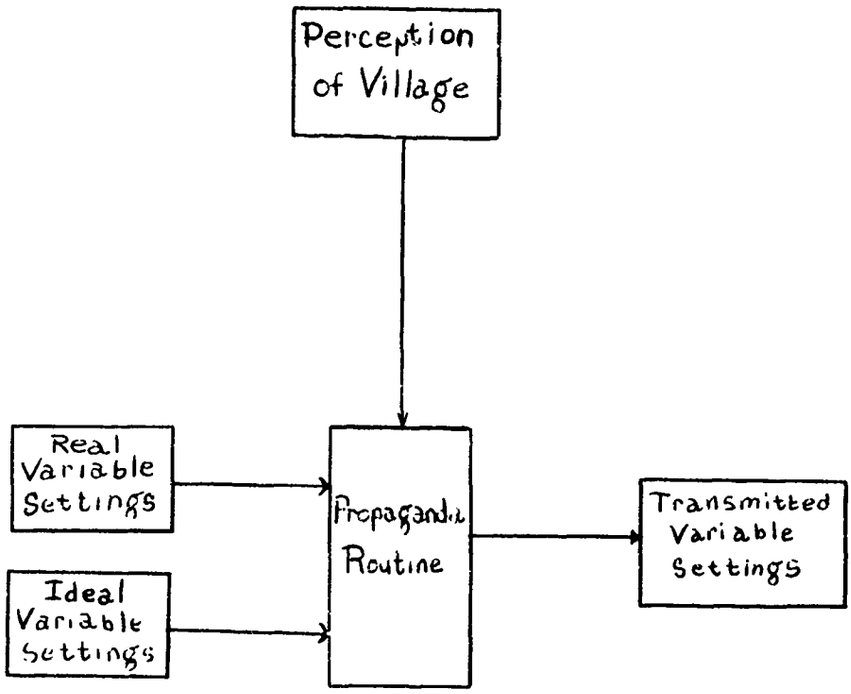

Compare Location of Action and of Perceiver and find Affect
Calculate Potential Effect of Action on Loyalty
Calculate Actual Loyalty Change
If weighted sum of Loyalty Change and Affect > Threshold, "Unfreeze" and change Ψ type

Propaganda

The essence of belligerent-to-village communication is exaggeration. Each belligerent will transmit information biased in his favor; he may also grant requests and make demands. In addition, the belligerents may transmit non-harmful, verifiable information. The size of the bias in the information is determined by the propaganda routine.

Propaganda Routine

All B_ _ _ variables set to "favorable" settings. Compare real with ideal settings and set number in between, depending on past action in village -- if favorable, toward higher setting; if unfavorable, more toward real.

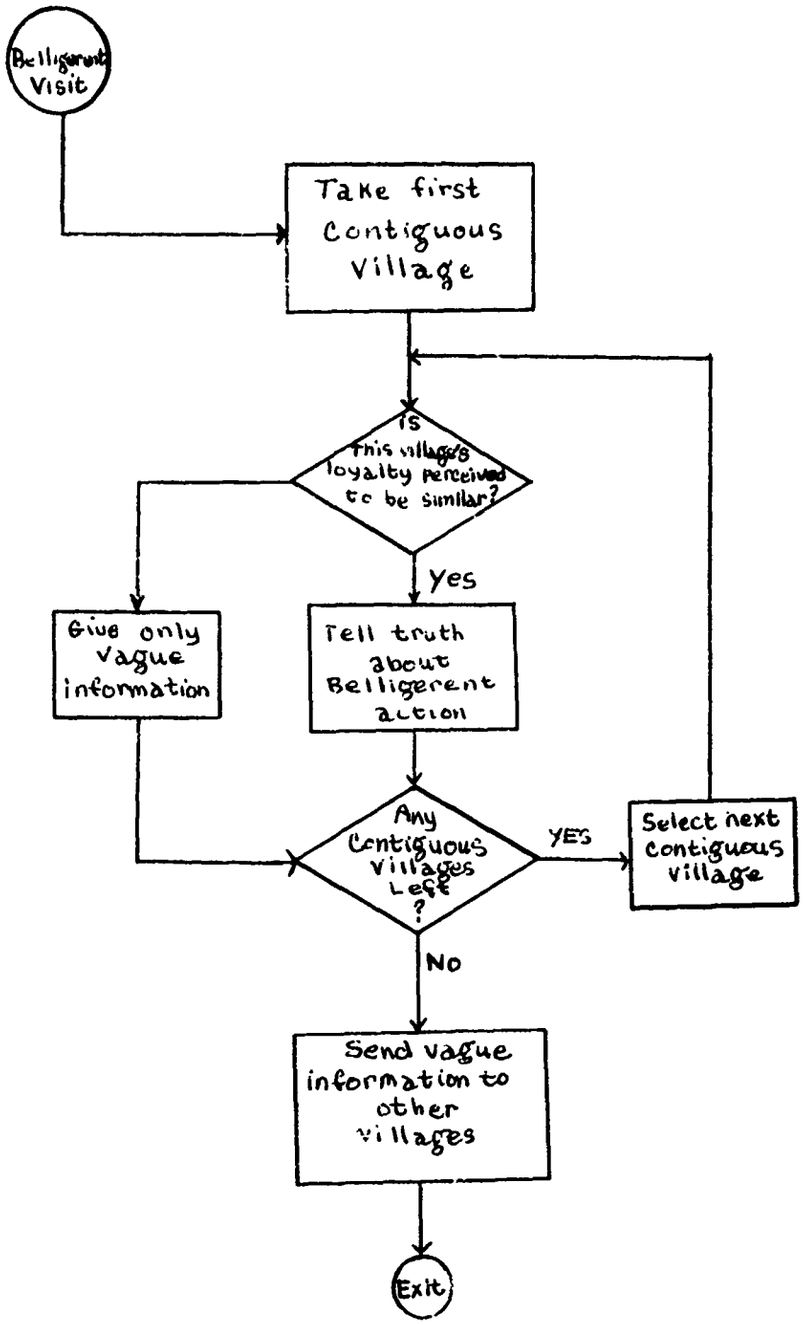


Ripple

This routine provides for the passage of information outward from a village in a manner analogous to the spreading of ripples in a pool of water.

The village in which the action takes place provides information to its contiguous villages after altering the information in a direction favorable to the side the source village favors. Non-contiguous villages receive less and less information (information being inversely proportional to distance).

Ripple Routine



VILLAGE ROUTINES

Action

Resist

Warn

Cohesiveness

Loyalty

Election

Action

Whenever the belligerent enters a village and intends to take an action, the VILLAGE ACTION ROUTINE handles the village response to this action. Certain actions are resistable or arguable, eg., recruitment, impressment, etc. Other belligerent actions do not elicit a direct response but affect loyalties and strategies, eg., return men, threaten, etc.

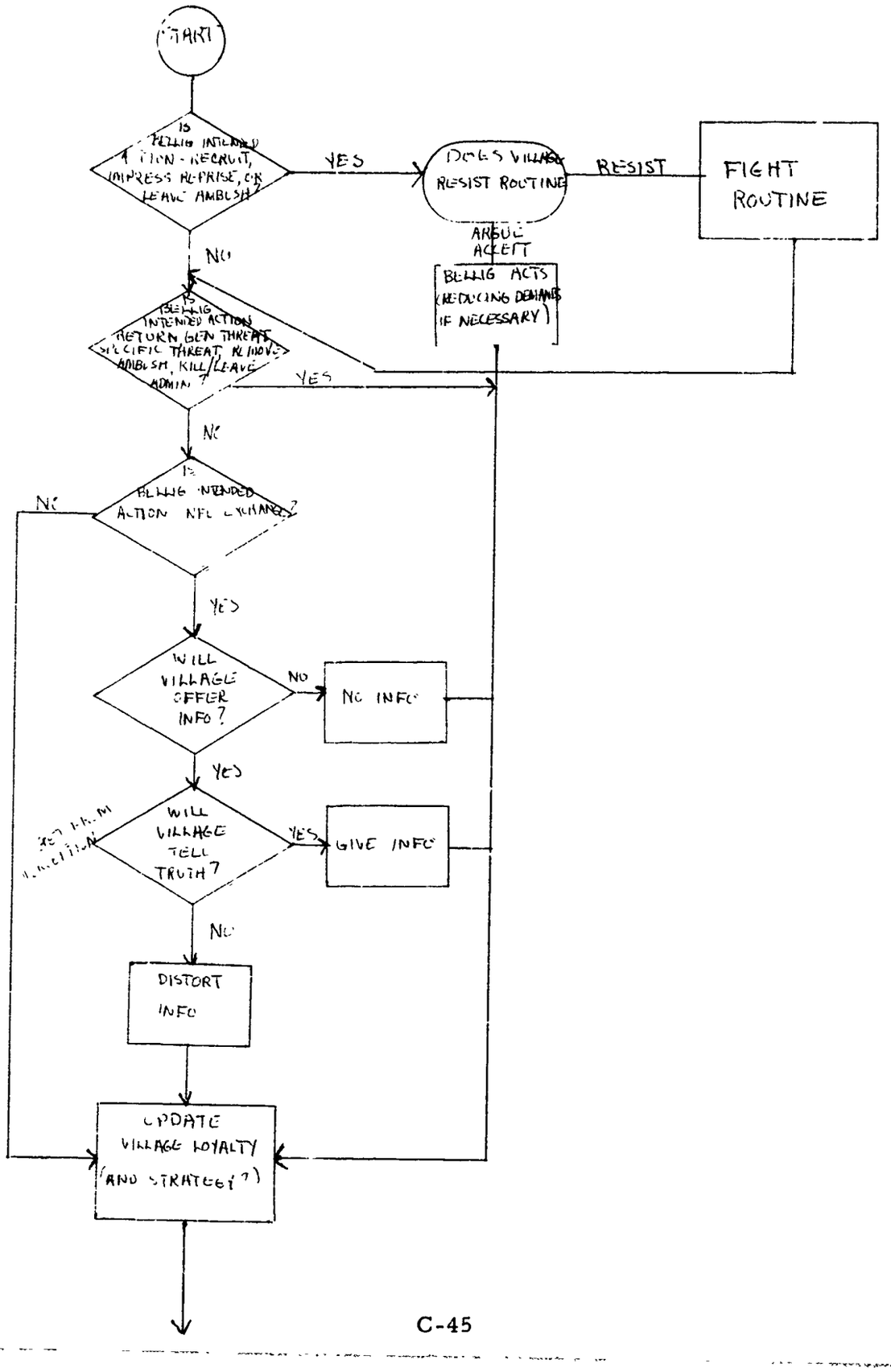
If the belligerent asks for information, the village must decide whether to offer information or not, and if so, whether to tell the truth or not.

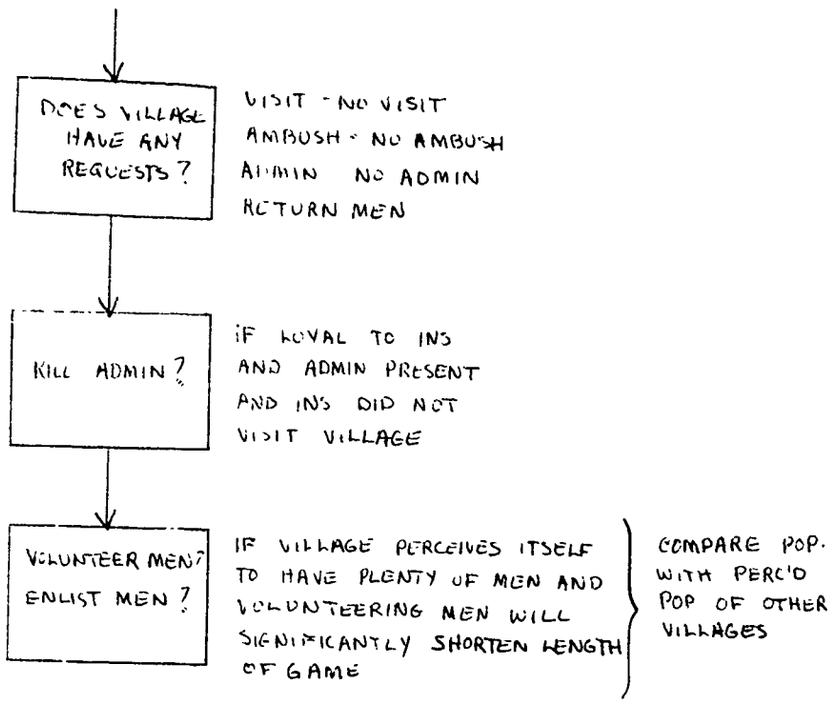
Whatever the village response to a particular belligerent action, the village re-evaluates its loyalty and strategy based on the events that have just taken place.

The village then may make any requests it wishes -- visit, no visit, ambush, no ambush, administrator present, no administrator, return men.

Finally there are several actions which the village may initiate. It may kill the administrator if it is loyal to insurgents and insurgents did not visit the village this move. It may volunteer or enlist men if it perceives that this will make a significant difference in ending the game and it has men to spare.

VILLAGE ACTION ROUTINE



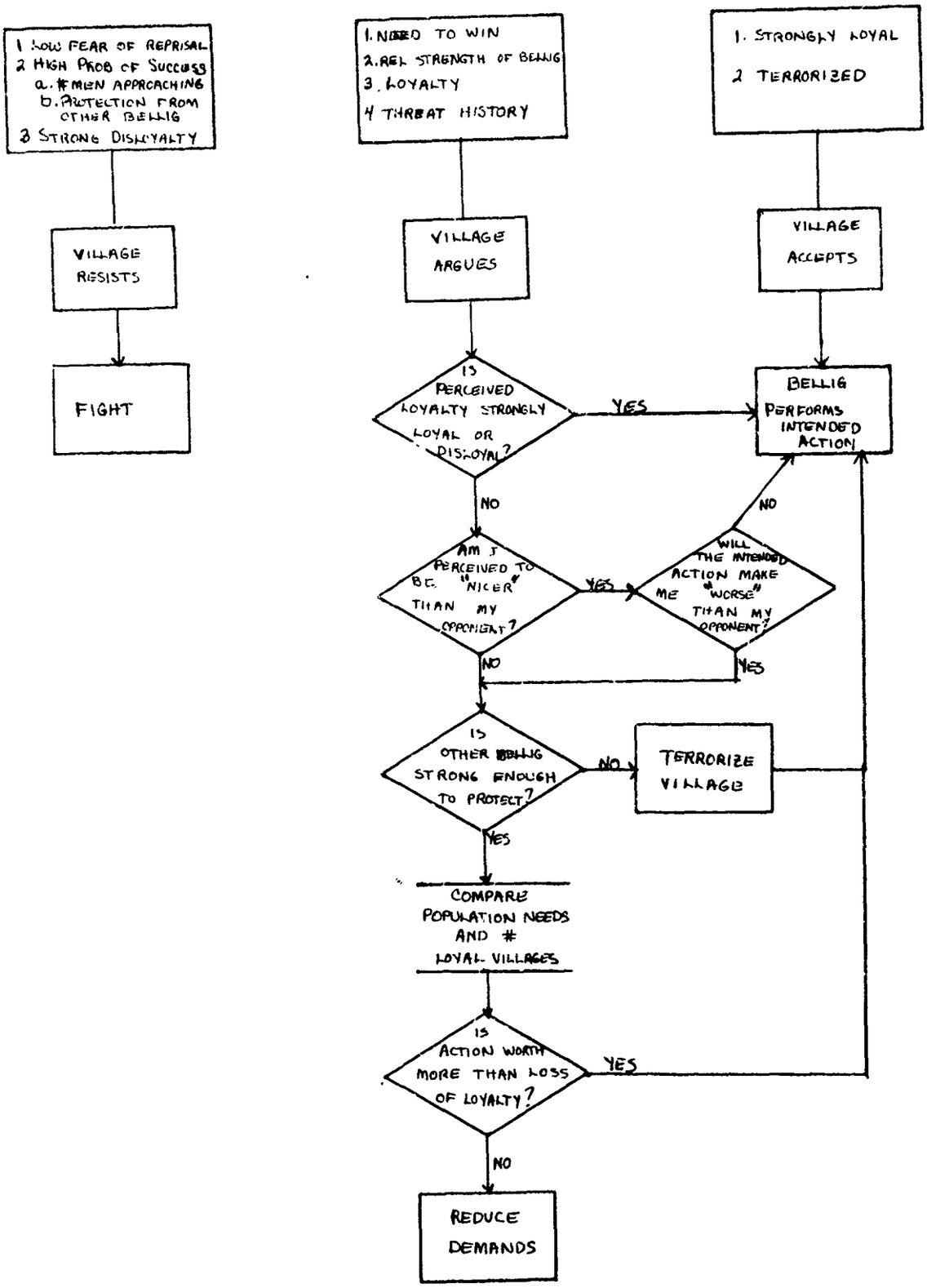

DOES VILLAGE HAVE ANY REQUESTS?
VISIT - NO VISIT
AMBUSH - NO AMBUSH
ADMIN NO ADMIN
RETURN MEN
KILL ADMIN?
IF LOYAL TO INS AND ADMIN PRESENT AND INS DID NOT VISIT VILLAGE
VOLUNTEER MEN? ENLIST MEN?
IF VILLAGE PERCEIVES ITSELF TO HAVE PLENTY OF MEN AND VOLUNTEERING MEN WILL SIGNIFICANTLY SHORTEN LENGTH OF GAME
COMPARE POP. WITH PERC'D POP OF OTHER VILLAGES

Resist

Based on a network of conditions the village may decide to resist, argue, or accept certain belligerent actions, eg., enter village, recruit, impress, leave ambush.

If the village decides to accept, obviously the belligerent performs its intended action. If the village resists, then there is an engagement and the losses are calculated. However, if the village argues, the belligerent must decide whether to go ahead with the intended action, reduce its demands, or terrorize the village (and go ahead with the intended action).

RESIST ROUTINE



Warn

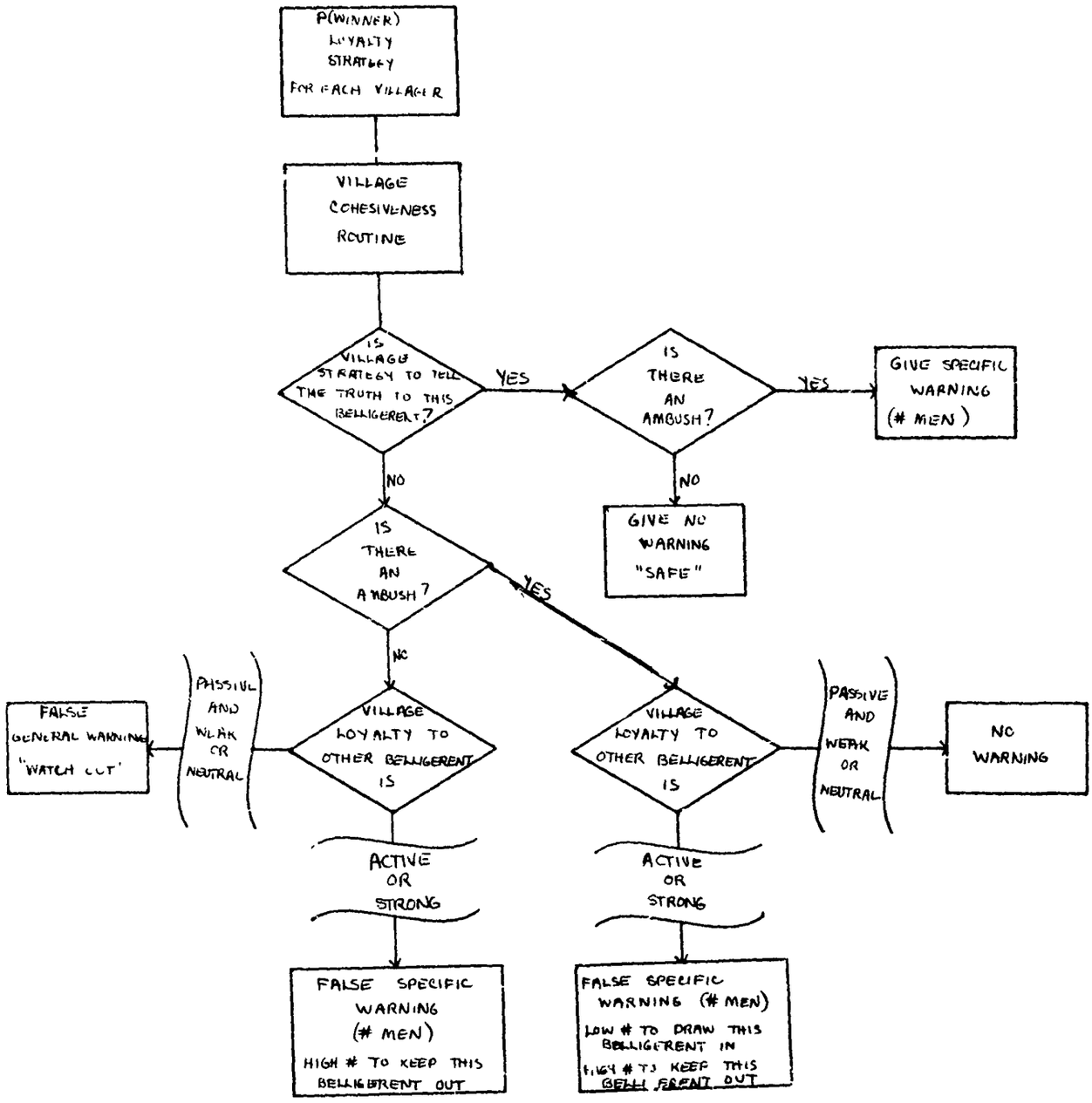
Whenever a belligerent approaches a village, the villagers must decide to give:

no warning
general warning
specific (size of ambush force) warning

Both general and specific warnings may be either true or false. The village may attempt to keep a belligerent out by warning of an ambush when there is none. Similarly, the village may attempt to lure a belligerent into an ambush by giving a specific warning of an inferior ambush force size when in fact it is superior.

The warning decision is affected by the village's cohesiveness, loyalty, and village chief. As dissention among villagers over such decisions increases, village elections are permitted.

VILLAGE WARNING ROUTINE


P(WINNER) LOYALTY STRATEGY FOR EACH VILLAGER
VILLAGE COHESIVENESS ROUTINE
IS VILLAGE STRATEGY TO TELL THE TRUTH TO THIS BELLIGERENT?
YES
IS THERE AN AMBUSH?
YES
GIVE SPECIFIC WARNING (# MEN)
NO
GIVE NO WARNING "SAFE"
NO
IS THERE AN AMBUSH?
YES
NO
VILLAGE LOYALTY TO OTHER BELLIGERENT IS
PASSIVE AND WEAK OR NEUTRAL
FALSE GENERAL WARNING "WATCH OUT"
ACTIVE OR STRONG
FALSE SPECIFIC WARNING (# MEN)
HIGH # TO KEEP THIS BELLIGERENT OUT
VILLAGE LOYALTY TO OTHER BELLIGERENT IS
PASSIVE AND WEAK OR NEUTRAL
NO WARNING
ACTIVE OR STRONG
FALSE SPECIFIC WARNING (# MEN)
LOW # TO DRAW THIS BELLIGERENT IN
HIGH # TO KEEP THIS BELLIGERENT OUT

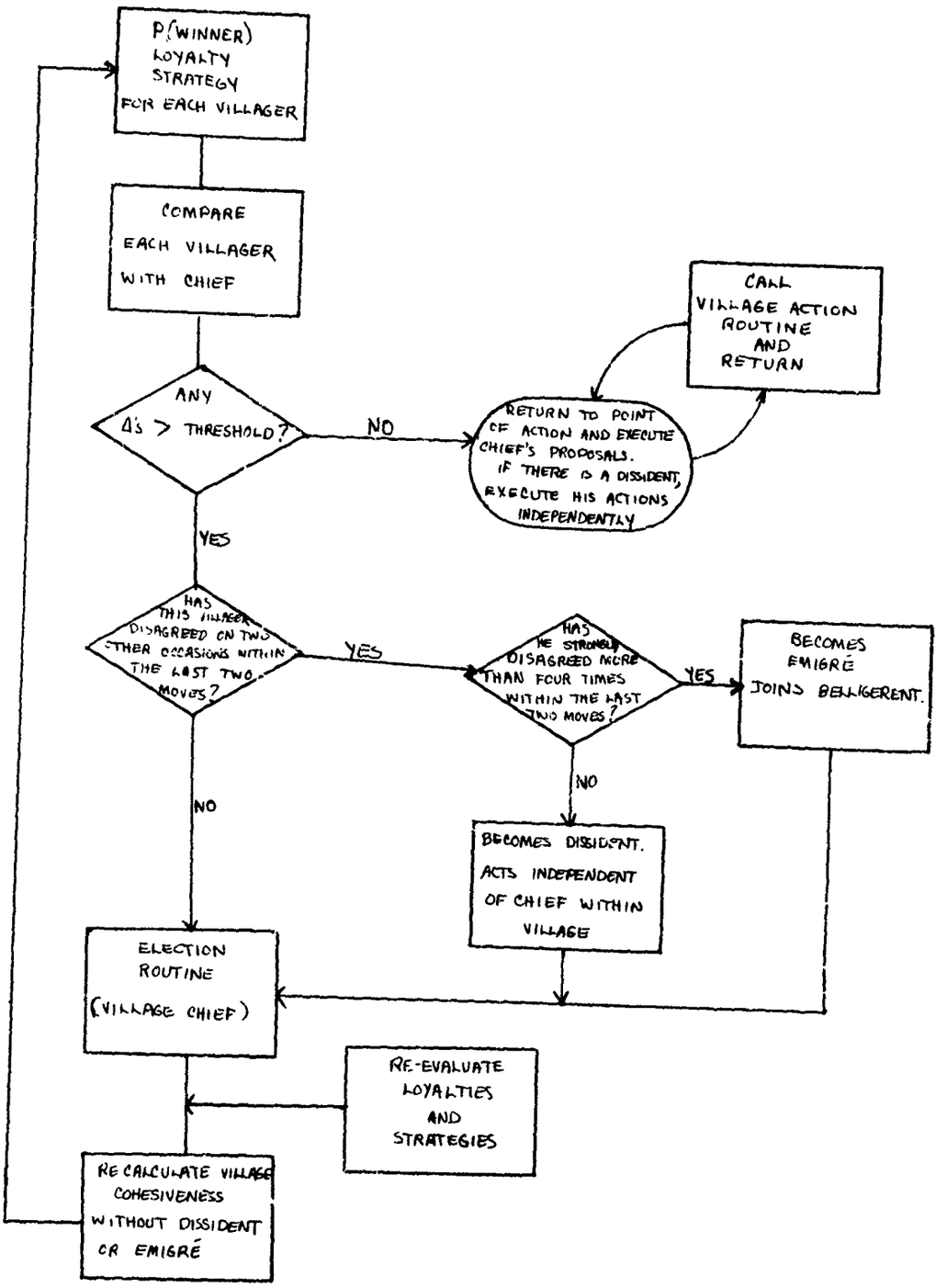
LOYALTY:

0-1 STRONG INS
2-3 WEAK INS
4-6 NEUTRAL
7-8 WEAK GOV'T
9-10 STRONG GOV'T.

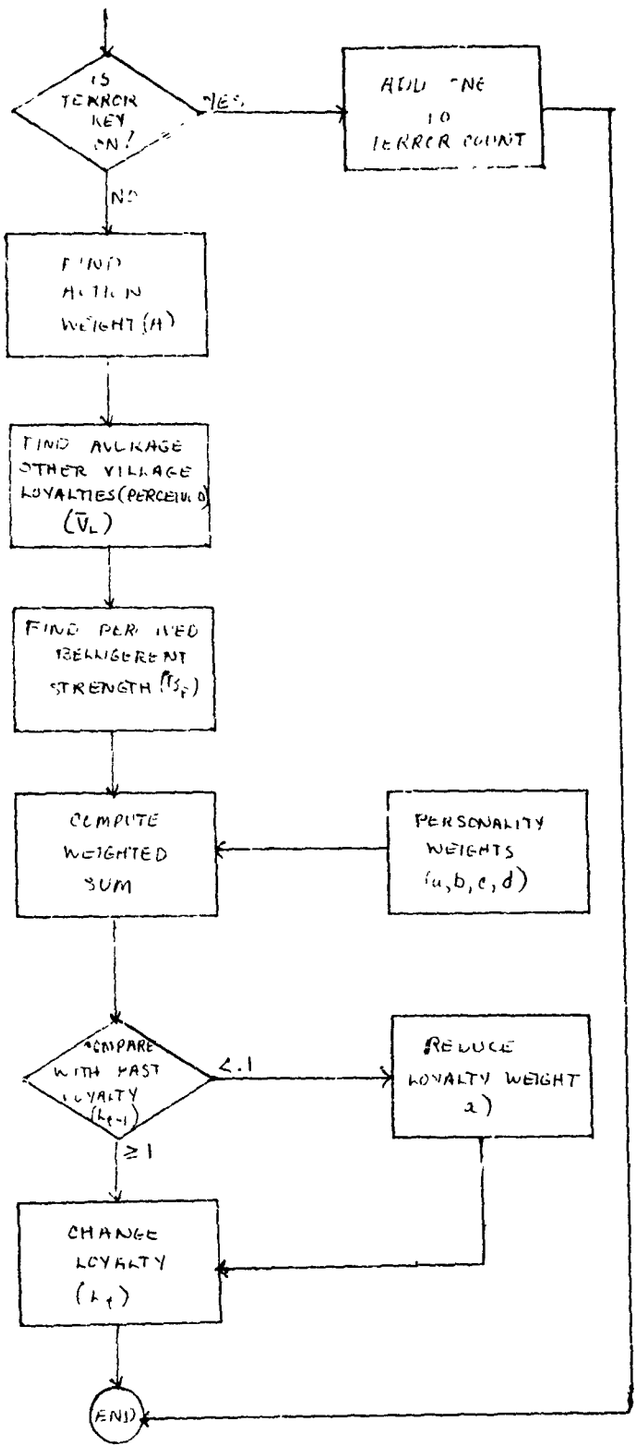
Cohesiveness - Loyalty - Election

Each village is represented by a village chief. Usually, the village chief's decisions are implemented by the entire village. However, the degree of agreement and cooperation among the villagers on such decisions depends upon the cohesiveness of the village. Since each village faction has its own perception and personality, it develops its own loyalty. As the range of faction loyalties increases, the degree of village cohesiveness decreases and the number of disagreements increases. These bring with them the need for a new village chief who more closely satisfies the desires of the villagers. The village chief is chosen through the village chief election.

VILLAGE COHESIVENESS



LOYALTY FLOW CHART



LOYALTY

$$\Delta L = \text{key}\,(L_t - aL_{t-1}) = \text{key}\left[\frac{b(B_p - N_p) + c \cdot \bar{V}_L + d \cdot A}{b + c + d}\right]$$

ΔL = Village loyalty change
L_t = Village loyalty at time t
B_p = Perceived Belligerent strength on a scale from [0 - 10]
N_p = Perceived Belligerent need for men on a scale from [0 - 10]
$\bar{V}_L$ = Average other village loyalties (perceived)
A = Specific action weight (see table)
key = Terror key (1 normal, 0 terrorized (no change))
a, b, c, d, Parameters describing village personality

In addition, coefficient a decreases over time if L (Village Loyalty) is constant according to the equation:

$$a_t = (a_{t-1} - a_1) \geq 0 \quad \text{if } \Delta L \text{ is } < .1$$

where:
a_{t-1} = coefficient setting last time
a_1 = coefficient describing rate of decay

Initial Settings for Personality Coefficients (a, a_1, b, c, d)

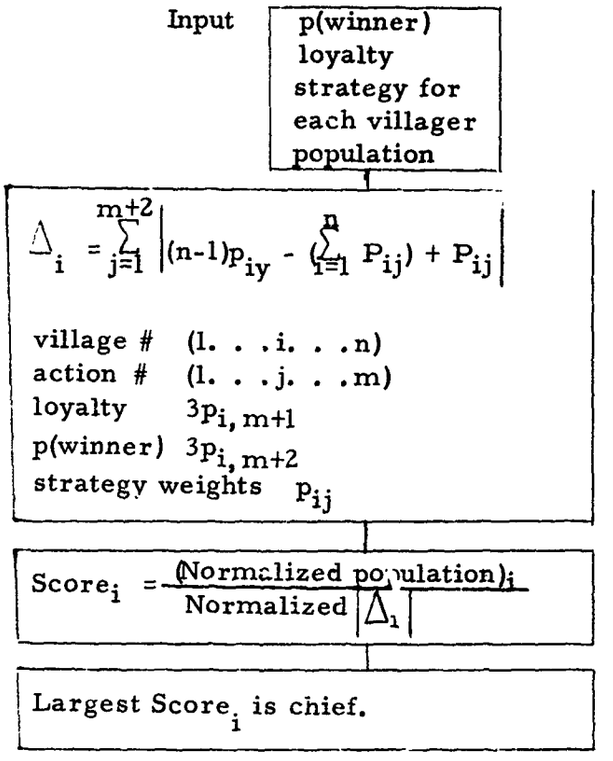
Coefficient \ Personality	Weak	Moderate	Mild	Strong
a	1.	3	6	10
a_1	0.	.25	.5	1
b	5.	4	3	2
c	5.	4	3	2
d	1.	.1	2	3

Note: a starts initially at value set in table and decays at a rate, a_1, when loyalty is static

Table of Action Weights (A)

Belligerent Action Taken Against Village	Utility Score
Killed Villagers	-2
Reprisal	-1
Impressment	-1
Accepted False Warning	-1
Killed Administrator	+1
Passed Information	+1

VILLAGE CHIEF ELECTION



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13. Abstract

This report presents the results of a six-month effort by Abt Associates Inc. to develop a game and explore the feasibility of a computer model based on game findings that simulate some of the major aspects of the terror-phase of internal revolutionary conflict. The game, known as the ARPA-AGILE COIN GAME, was played fifteen times by a varying group of Abt Associates Inc. staff members, area experts, scholars from Harvard and MIT, and players from several government agencies. In the course of the manual simulations the game's rules and conditions were refined toward increasing realism and playability. A set of detailed flow charts was developed for a design for a computer model simulation of elements of the terror phase of internal war, based on the game. The game was refined to the point of readiness for its application to counterinsurgency (COIN) training. This report covers the usefulness of manual games and simulation for insurgency research; the COIN Game design, development and testing; research findings; the man-machine method for model building; and the AGILE-COIN model simulation.

14. Key Words -- Counterinsurgency, Insurgency, Simulation, Military Science, Political Science

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